Science and Christian Belief

Volume 35 (2) 89-206
October 2023

Science and Christian Belief

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

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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

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KEITH FOX

Editorial

In this issue

The two main articles in this issue concern two different aspects of the physical sciences.

The first article by Robert Dutch discusses the challenges of becoming carbon neutral in order to avert the oncoming climate crisis. As the author discusses, we cannot escape our ongoing need for energy, but asks how this can be provided. This paper advocates the use of nuclear energy as a non-polluting means to achieve this. There will undoubtedly be a wide range of opinions on this energy strategy. This article aims to help people to become better informed about the place of nuclear energy, and encourages open discussion on its merits in protecting people and our planet. The article contains references to a large amount of background information. In order to keep the main text to a manageable length, further supporting information is available online in a separate file, which is not part of the main text.

The second article, by Alessandro Giostra, concerns the way that the mathematic nature of the universe is itself a divine gift and inspires knowledge of God and worship of the creator. This is considered in the light of the ideas expressed by Galileo and Kepler and their understanding of the mathematical beauty of the created order.

McGrath – Festschrift

In July 2022 a conference was held at the Ian Ramsey Centre for Science & Religion in Oxford, in honour of Alister McGrath, who had recently retired as the Andreas Idreos Professor of Science and Religion at the University of Oxford. A selection of six papers from this conference is included in this issue as a Festschrift, honouring Professor McGrath's work. These are introduced with a separate Guest Editorial by Ravi Jain.

Faith and Thought

Science & Christian Belief is jointly published by Christians in Science (CiS) and Faith and Thought (the Victoria Institute). Now that S&CB has successfully moved to online only publication, we have agreed that Faith and Thought (F&T) will also include the book reviews in the printed issues of *Faith and Thought*. F&T members are able to access the online full articles in S&CB. In return all CiS members will be able to access the online version of F&T; if you want to do this please contact admin@faithandthought.org.

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

ROBERT S DUTCH

A Christian perspective on the place of nuclear energy in achieving net zero and national security[1]

Abstract

We need energy. But what are potential solutions to achieving net zero? This paper presents a Christian perspective and overview of nuclear energy in the UK, and other countries, within the context of government policies to achieve net-zero emissions while ensuring national security. The growth of renewables is well-known but nuclear energy's positive contribution is often unrecognised in our energy mix for producing electricity. Nuclear provides clean, low-carbon baseload electricity and has its place alongside variable renewables in tackling climate change. Besides large reactors, small modular reactors (SMRs) are being considered within energy strategies. Beyond electricity generation, future nuclear plants offer cogeneration. Furthermore, nuclear plants do not create the air pollution associated with fossil-fuel emissions. This paper encourages people to become more informed about the place of nuclear energy by looking at an evidence-based approach and encourages discussion in an open, honest, and respectful way about its merits in protecting people and our planet.

Keywords: clean, low-carbon, net zero, pollution, reliable, renewables, security, SMRs, waste

Introduction

Climate change is here as the Intergovernmental Panel on Climate Change (IPCC) and the UK Met Office inform us. New UK record temperatures were set in 2021 and on 19 July 2022 the UK had its highest recorded temperature ever at 40°C.[2] The 2023 IPCC *AR6 Synthesis Report* summarises our current state

1 Additional information is available online at www.scienceandchristianbelief.org/ with details on: The UK's nuclear industry; Industrial Strategy and British Energy Security Strategy; Sizewell C Power Station and hydrogen production; Small modular reactors; Interconnectors and batteries; An international perspective post-Fukushima.

2 Met Office. What is climate change? www.metoffice.gov.uk/weather/climate-change/what-is-climate-change. See also: Met Office, Climate change in the UK, www.metoffice.gov.uk/weather/climate-change/climate-change-in-the-uk and Met Office, Key climate change indicators break records in 2021, www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/key-

of knowledge, impacts, risks, mitigation, and adaptation. It states that impacts of a hotter, and changed world, on current and future generations depends on both current and near-term choices. Its press release summarises the considerable challenges in achieving climate justice: *Urgent climate action can secure a liveable future for all*.[3] The main cause is widely accepted to be the burning of fossil fuels, but how do nations make a just transition to a cleaner low-carbon world? Clean electricity supply systems are crucial in going green and have generated debate over the use of renewables versus nuclear electricity generation. This paper considers these power sources as complementary in dealing with the challenges of climate change and notes that flexible nuclear power has benefits that go beyond its traditional role of providing electricity. I endeavour to present an evidence-based examination of the place of nuclear energy in achieving net zero and national security that addresses those who wish to increase their understanding of nuclear energy. This paper references my book *Let There Be Light! Nuclear Energy: A Christian Case* which examines nuclear power's benefits, while chapters 5 and 6 address 'Concerns, Questions, Objections.' For example, chapter 6 covers safety, security, safeguards, accidents, and waste.[4]

Clarification on 'net zero'

The UK's Climate Change Act (2008) required legally binding reductions of emissions of carbon dioxide of 80% by 2050, compared with 1990 levels. It also appointed the Climate Change Committee (CCC) as an independent statutory body to advise the UK and devolved governments on emissions. The 80% figure was recommended to the Government by the CCC.[5] In 2019, the CCC recommended a new target of' net-zero greenhouse gases by 2050 based on the latest scientific evidence including the 2018 IPCC *Special Report on Global Warming of 1.5°C.* The Climate Change Act (2019) incorporated this more demanding target of 100% into law.

In May 2019, the CCC published *Net Zero – The UK's contribution to stopping global warming* in response to the governments of the UK, Wales, and Scotland request for a reassessment of the long-term emissions targets. It concluded: 'net-zero is necessary, feasible and cost-effective' and in reducing the

climate-change-indicators-break-records-in-2021.

3 IPCC. AR6 Synthesis Report: Climate Change 2023, www.ipcc.ch/report/ar6/syr/. Also IPCC. Urgent climate action can secure a liveable future for all, IPCC Press Release. www.ipcc.ch/report/ar6/syr/downloads/press/IPCC_AR6_SYR_PressRelease_en.pdf.

4 Dutch, R.S. *Let There Be Light! Nuclear Energy: A Christian Case*, Eugene, Oregon: Wipf & Stock (2017).

5 CCC. 'The UK's independent adviser on tackling climate change', www.theccc.org.uk It is also referred to as the Committee on Climate Change.

UK-produced emissions to zero, 'we also end our contribution to rising global temperatures.'[6]

Nevertheless, Dieter Helm regards this last statement as misleading because this net zero target 'is for territorial emissions *in the* UK'. It does not include imported carbon goods, or carbon consumption.[7] Helm sees the public misled, wasted years and failures. Mike Morecroft, president of the UK Christian charity The John Ray Initiative (JRI) and a Coordinating Lead Author for the IPCC notes that achieving net zero is not easy: it 'requires innovation, commitment and investment' plus it must support the poorest and vulnerable.[8]

Combatting climate change is not only about electricity production and related emissions but includes emissions from: agriculture; aviation; domestic and industrial heating; and transport.[9] Nevertheless, electricity is a major issue as we will use more of it to power electric vehicles, trains, domestic and industrial heating, and air conditioning. The UK's critical infrastructure, the National Grid, is being transformed through the incorporation of more renewables. However, wind and solar have drawbacks as the wind does not always blow and the sun does not always shine. Their intermittent nature means that other, more consistent, sources of electricity are required as well.[10]

It is important to address nuclear power because the public and Christian narratives often focus on the merits of renewables while neglecting nuclear's merits. Furthermore, silence, suspicion, or anti-nuclear arguments may hinder fruitful discussions and pro-nuclear supporters may self-silence for fear of adverse reactions. In my book I refer to the 'negative nuclear narrative' often used against the industry, while I advocate a more positive narrative, drawing upon my firsthand experience of being a scientist, engineer, tutor, and consultant in the UK's nuclear power industry. We need to talk, be truthful and transparent. Helm says we should tell the truth even if people do not like to hear about the UK's current energy system, intermittency, and exposure to global gas prices.[11]

6 CCC. Net Zero - The UK's contribution to stopping global warming, www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/.

7 Helm, D. *Net Zero: How We Stop Causing Climate Change*, London: William Collins (2020), pp. x-xii. On his book listen to the podcast Why Net Zero Doesn't Always Mean Net Zero, www.garp.org/podcast/not-net-zero-cr-210708.

8 Morecroft, M. JRI blog, What is Net Zero and why does it matter?, www.jri.org.uk/what-is-net-zero-and-why-does-it-matter/

9 See the report on public understanding: Institution of Mechanical Engineers, *Survey Results 2021*, February 2021. Public Perceptions: Greenhouse Gas Emissions, www.imeche.org/policy-and-press/reports/detail/public-perceptions-greenhouse-gas-emissions.

10 On myths, intermittency, and costs see: Helm, D. The first net zero energy crisis – someone has to pay 7 January 2022, www.dieterhelm.co.uk/energy-climate/energy/the-first-net-zero-energy-crisis-someone-has-to-pay-2/.

11 See his articles and videos at: Home - Dieter Helm, https://dieterhelm.co.uk/

Discussion is important in this contested area of energy, economy, environment, and ethics. When considering energy, national security is also crucial, as Russia's 2022 invasion of Ukraine demonstrates.

Talking about climate change

In 2020, Tearfund's Ruth Valerio asked: 'Why has the Christian faith not responded more wholesale and seriously to our climate crisis and caring for the natural world in general?' Her suggestions were barriers caused by: dualism, individualism, the new age, and the enlightenment. In May 2022, Emma Wyndham Chalmers (Tearfund – Australia) notes research indicated '35 per cent of senior church leaders say they rarely preach on environmental matters.' Why? Apparently, many saw politicisation of climate change as a key challenge. Yet many young Christian Australians are disappointed with the church's 'relative silence' and require more open talk.[12] Many years earlier, former Bishop of Birmingham Hugh Montefiore asked: 'Why aren't more church people interested in the environment?'[13]

Katharine Hayhoe, the Canadian evangelical Christian, and climate scientist advocates talking in a TED talk. Again, in her book *Saving Us: A Climate Scientist's Case for Hope and Healing in a Divided World* she reckons the most important action is talk.[14] Similarly, Emma Frances Bloomfield identifies communication strategies to engage US Christians in productive climate change conversations. After interviewing Christians from different denominations, she discovered their diverse views but encourages communication even with a controversial topic.[15] The Yale Climate Opinion Maps 2021 show that the estimated national average of US adults who 'think global warming is happening' is 72 per cent but the national average for those who talk about it 'at least occasionally' is just 35 per cent.[16]

12 Chalmers, E.W. The end of the climate wars is only the beginning: How Christians can improve the public conversation over climate change - ABC Religion & Ethics 30 May 2022, www.abc.net.au/religion/end-of-the-climate-wars-is-only-the-beginning/13905894.

13 Montefiore, H. *Why aren't more church people interested in the environment?* In: A Christian Approach to the Environment, Carling, R.C.J. and Carling, M.A. (Eds.) pp. 5-18. The John Ray Initiative (2005).

14 Hayhoe, K. The most important thing you can do to fight climate change: talk about it - TED Talk (November 2018), www.ted.com/talks/katharine_hayhoe_the_most_important_thing_you_can_do_to_fight_climate_change_talk_about_it. Also: Hayhoe, K. *Saving Us: A Climate Scientist's Case for Hope and Healing in a Divided World,* New York: One Signal Publishers (2021).

15 Bloomfield, E.F. Understanding Christians' climate views can lead to better conversations about the environment The Conversation 5 August 2019. www.theconversation.com/understanding-christians-climate-views-can-lead-to-better-conversations-about-the-environment-115693 .

16 Marlon, J., Neyens, L., Jefferson, M., Howe, P., Mildenberger, M., & Leiserowitz, A. Yale Climate Opinion Maps 2021 - Yale Program on Climate Change Communication. www.climatecom-

Talking about nuclear energy

In the UK, many people, including environmentalists and Christians, portray themselves as pro-renewables but are less inclined to self-identify as pro-nuclear. However, I consider that nuclear energy offers an important contribution to solving our climate crisis and energy security. Traditionally, most Greens have opposed nuclear energy e.g. Greenpeace's '6 reasons why nuclear energy is not the way ….' asserts it 'is often hailed as a magic bullet solution'. [17] But I am not claiming this, rather I am convinced it has an ongoing valuable place.

A public communications approach is advocated by the UK's Nuclear Industry Council (NIC) on effective engagement, since public support for nuclear 'is fragile and cannot be taken for granted,' rather, the industry must improve. It shared four principles, noting in Principle 2 Best practice, that public engagement will be characterized by: dialogue, trust, clarity, and consultation.[18] The UK's National Nuclear Laboratory (NNL) played a key role in developing the *Concordat* as did public dialogue participants.[19]

Talking about climate solutions should be done with respect and in love. For example, US climate scientist Michael M. Mann – who I once heard speak at Bristol University – explained how he was badly treated by powerful politicians. Now Mann supports use of *existing* nuclear plants until their retirement but does not support new nuclear. Nevertheless, he offers a paradigm with: 'There is a good-faith argument to be made, for example, that nuclear energy should be part of the solution, and I have colleagues whom I deeply respect who are bullish on the role it might play …,'[20] Billy Gates' *How to Avoid a Climate Disaster* presents a detailed discussion for supporting new nuclear build. Of course, climate change is not solely about technology, and government policies, but families, friends, foes, future generations, health, biodiversity, and our

munication.yale.edu/visualizations-data/ycom-us/. For further research see: Alper, B.A. How Religion Intersects With Americans' Views on the Environment Pew Research Center 17 November 2022. https://www.pewresearch.org/religion/2022/11/17/how-religion-intersects-with-americans-views-on-the-environment/.

17 Leman, M. 6 reasons why nuclear energy is not the way to a green and peaceful world. Greenpeace 18 March 2022. www.greenpeace.org/international/story/52758/reasons-why-nuclear-energy-not-way-green-and-peaceful-world/

18 NIC. *Nuclear Energy and Society: A Concordat for Public Engagement.* December 2015, pp. iii, 2. https://tinyurl.com/bdh29425

19 NNL. Public Dialogue Study On Nuclear Sector Communications. www.nnl.co.uk/innovation-science-and-technology/showreel/public-engagement/public-dialogue-study-on-nuclear-sector-communications/. See the link to the 2016 PowerPoint: *Findings of a public dialogue on how the nuclear industry engages and communicates with society on nuclear energy issues*. www.nnl.co.uk/wp-content/uploads/2019/12/IP20038.590061003-Nuclear-Energy-Society-Summary-Visual-Report.pdf.

20 Mann, M.M. *The New Climate War: the fight to take back our planet*, London: Scribe Publications (2021), pp. 169-171.

shared planet. Communicating climate change and investigating all solutions is essential.

There are pro-nuclear voices from people not claiming to be Christians (as far as I know). Respected veteran British environmentalist James Lovelock was a long-standing pro-nuclear proponent as he demonstrates in *The Revenge of Gaia* (2006). Under 'The Right Mix of Energy Sources' he makes a strong case for nuclear while recognising it is not a panacea but essential in an energy portfolio.[21] Further, American author Gwyneth Cravens, began a mission to investigate, and understand, nuclear energy as a sceptic but changed her views as documented in her informative book: *Power to Save the World: The Truth About Nuclear Energy* (2007). Mark Lynas, the environmental writer, and activist, who wrote *Six Degrees: Our Future on a Hotter Planet* (2007) also authored *Nuclear 2.0: Why a Green Future Needs Nuclear Power* (2013).

Scientist and former investment banker, Mathew Hampshire-Waugh's *Climate Change and the Road to Net-Zero* provides evidence-based discussions on energy sources and solutions. Chapter 7 'Sustainable Energy' is particularly relevant. He sees nuclear energy, even with four major accidents, as 'statistically the safest energy source with no dangerous atmospheric emissions.' Much of his evidence-based material is available online.[22] Michael Shellenberger's *Apocalypse Never* also provides extensive evidence on nuclear's merits.[23]

In June 2021, the University of Manchester's Dalton Nuclear Institute published its detailed report: *Nuclear energy for net zero: a strategy for action*. Here Francis Livens stated that reaching net zero by the 2050 target 'is extremely ambitious' and we should not underestimate the effort. Moreover, he said that the development of new reactor technology is needed now. It 'must be developed, demonstrated, licensed and built by the 2040s.'[24] Eight recommendations support the nuclear section to achieve its potential. Moreover, recommendation six says that the Climate Change Committee's 'net zero path' should examine an enlarged role for nuclear.

Further, in June 2022 a significant in-depth report *Beautiful Nuclear: Driving*

21 Lovelock, J. *The Revenge of Gaia: Why the Earth is Fighting Back – and How We Can Still Save Humanity*, London: Allen Lane (2006), pp. 87-105.

22 Hampshire-Waugh, M. *Climate Change and the Road to Net-Zero*, London: Crowstone Publishing (2021), p. 196. The accidents were: SL1 explosion in Idaho (US, 1961); Three Mile Island (US, 1979); Chernobyl (Russia, 1986); and Fukushima (Japan, 2011). His website is NET-ZERO, www.net-zero.blog/.

23 Shellenberger, M. *Apocalypse Never: Why Environmental Alarmism Hurts Us All*, New York: HarperCollins (2020).

24 Bodel, W., Butler, G., & Matthews, J. Nuclear energy for net zero - Dalton Nuclear Institute - The University of Manchester June 2021, foreword. www.dalton.manchester.ac.uk/nuclear-energy-for-net-zero/

Deep Decarbonisation began by quoting committed environmentalists George Monbiot, Mark Lynas, and Chris Goodall: 'our conversion to the cause of nuclear power was painful and disorienting. All of us carried a cost in changing our position, antagonising friends and alienating colleagues. But we believe that shutting down — or failing to replace — our primary source of low carbon energy during a climate emergency is a refined form of madness.' It shows how nuclear contributes to the UN's Sustainable Development Goals (SDGs).[25]

What then about the positions of green groups? Bishop Montefiore was an environmentalist who became pro-nuclear but had to leave his position in Friends of the Earth for his clear stance. Greenpeace maintains its opposition to nuclear. Former Extinction Rebellion spokesperson Zion Lights left the movement after becoming dissatisfied that it did not offer solutions. She became a pro-nuclear advocate and stated that instead of the green movement's anti-nuclear position she considered 'any rational, evidence-based approach shows that a strategy including nuclear energy is the only realistic solution to driving down emissions at the scale and speed required.'[26] She founded the website 'Emergency Reactor.'

The website 'Greens for nuclear energy' notes that members increasingly support nuclear; it aims to influence the green movement to change its oppositional stance. Its Home page respectfully urges 'fellow Green Party members to approach the nuclear power debate with an open mind and not fall victim to the "easy way out" of dogmatic, hard-wired anti-nuclear ideology.' This is amplified in its film 'Critical.'[27] A January 2022 poll, conducted in the UK by Ipsos on behalf of 'Greens for Nuclear Energy,' revealed the broad support of nuclear by most people 'involved in environmental campaigning organisations.' A November 2022 poll, confirmed 'people involved in environmental campaign organisations … are more likely to support than to oppose the use of nuclear energy for electricity production in the UK.'[28]

25 Gogan, K., Ingersoll, E., Partanen, R., Tiemann A., & Vysatovaet, R. *Beautiful Nuclear: Driving Deep Decarbonisation*, LucidCatalyst 2020. www.lucidcatalyst.com/_files/ugd/2fed7a_a69448de67fa47918bca4efa749d67db.pdf.

26 BBC. Extinction Rebellion: Nuclear power 'only option' says former spokeswoman. 10 September 2020. https://www.bbc.co.uk/news/uk-54103163. Also see: Lights, Z. 'Why I rebelled against Extinction Rebellion... and went nuclear: In an astonishing and brave volte-face, the eco-group's ex-spokesperson ZION LIGHTS reveals why she has changed tack over the future of energy', *MailOnline* 10 September 2020, www.dailymail.co.uk/debate/article-8716403/XRs-ex-spokesperson-ZION-LIGHTS-reveals-changed-tack-future-energy.html.

27 Greens for Nuclear Energy. 'No compromise to combat climate change: A Green Party Nuclear Energy Policy fit for the 21st Century', 2020. www.greensfornuclear.energy/.

28 Greens for Nuclear Energy. Green sympathisers support nuclear energy, across a range of questions. February 2022, www.greensfornuclear.energy/green-sympathisers-support-nuclear-energy/. Also see: Green sympathisers STILL support nuclear energy, across a range of questions. November 2022. www.greensfornuclear.energy/green-sympathisers-still-support-nuclear-energy-across-a-range-of-questions/

Lynas recently published an article about Finland's Green Party and its change to endorse a pro-nuclear stance in its national meeting and manifesto. The Vice chair and Leader of the Green parliamentary group, Atte Harjanne, states regarding the challenge: 'we need all sustainable tools: wind, solar and nuclear.'[29] Finland's Green Party is the first in the world to make this historic change. I hope that other green parties will follow their example.

Over decades, anti-nuclear groups have publicly voiced their opposition. I am aware of this from employment, from 1970, at nuclear plants as a young scientist involved in radiation protection and environmental monitoring. But what are public perceptions? I offer two examples. Nuclear's roles are frequently underappreciated as the UK's Department of Business, Energy and Industrial Strategy (BEIS) demonstrates in its *Public Attitudes Tracker Spring 2022*. For example, in Winter 2021 people were asked: 'From what you know, or have heard about using nuclear energy for generating electricity in the UK, do you support or oppose its use?' The percentage total support was 37% (with 13% strongly supported), while the total opposed was just 14% (with 6% strongly opposed). However, 49% did not have an opinion (28% neither supported or opposed while 21% did not know). On small modular reactors (SMRs) 54% of people had never heard of them and another 39% 'know a little or hardly anything.'[30]

In 2022, YouGov conducted, a public survey on nuclear energy for the Radiant Energy Group – published in the *State of Nuclear Energy Support in the UK and its Driving Forces*.[31] This survey is part of the Nuclear Confidence Project which aims to educate the nuclear industry by tracking public perceptions on clean energy sources and drivers on attitudes. The summary report recognises that nuclear 'has record public support'. However, the industry needs to communicate better with the public, understanding what motivates them to act – hopes and ambitions – not just fears.

Christian contributions

So where do Christians and churches stand in this important dialogue on climate change solutions and energy security?[32] I address this topic in my book's

29 Lynas, M. Finland's Green Party endorses nuclear power - Alliance for Science, 23 May 2022, www.allianceforscience.org/blog/2022/05/finland-green-party-nuclear/

30 BEIS. *Public Attitudes Tracker: Energy Infrastructure and Energy Sources, Spring 2022, UK*, pp. 21-23, 16 June 2022. www.gov.uk/government/statistics/beis-public-attitudes-tracker-spring-2022.

31 The summary, with a link to the full report, is: Radiant Energy Group. 'State of Nuclear Energy Support in the UK and its Driving Forces', August 2022, https://www.radiantenergygroup.com/reports/state-of-nuclear-energy-support-in-the-uk-and-its-driving-forces?mc_cid=f6f13be1aa&mc_eid=753f1a3943.

32 For further discussion see Dutch, *ibid*. chapter 4 'Energy Policies and Positions' with a section

chapter 4 'Energy Policy and Positions,' but it is worth revisiting. And I should say that in the nuclear industry where I worked as a Christian there were other Christians, and those of other faiths, or none. This remains the case today.

There is a spectrum of views. In 2006, Christian Ecology Link (CEL, now Green Christian) published *FAITH AND POWER: The Case for a Low Consumption, Non-Nuclear Energy Strategy*. This paper gives useful principles and received support from church leaders but its anti-nuclear stance is clear. In contrast, Christian author Ian Hore-Lacy, while working for the World Nuclear Association, had published in *Science and Christian Belief* 'Nuclear Power and Energy Sustainability' (2011), contending: 'Christian stewardship of God's creation in applying its bounty to human needs appropriately involves utilising nuclear power more widely'.[33] He observes its section 'Christian Principles to underpin Energy Strategy' is 'unexceptional', but in 'Assessing the Nuclear Option' he saw, from his first-hand experience, 'many errors and misrepresentations.'[34] He provides informed arguments for evaluating nuclear energy as God's provision in creation. Baptist minister John Weaver, in *Christianity & Science*, helpfully addresses the nuclear energy option. Moreover, he points out that renewables are not 'entirely problem free.'[35]

In *The Cambridge Companion to Christian Ethics* (2012), Michael S. Northcott addressed 'Ecology and Christian Ethics,' but only has a passing note on nuclear.[36] Sadly, Martin J. Hodson & Margot R. Hodson's *A Christian Guide to Environmental Issues* (2021) in chapter 6 'Energy,' too quickly dismiss nuclear noting people's concern over safety and waste. With both fossil fuels and nuclear dismissed they focus on renewables. This does not do justice to the topic when in a climate crisis we must examine all possible solutions.

My book's pro-nuclear contribution, is endorsed by both Anglican and Baptist Christians with a foreword from Kenneth Stewart (former Director of Pastoral and Mission Studies at Bristol Baptist College). See the review by John Weaver.[37]

It is essential for Christians to be scientifically informed as a recent US article notes 'Nuclear fusion discovery promises clean energy: Why Christians

'Churches and Christians'.

33 Hore-Lacy, I. 'Nuclear Power and Energy Sustainability', Science & Christian Belief (2011) 23(2), p. 159-176.

34 *ibid*., p. 175.

35 Weaver, J. *Christianity & Science*, London: SCM Press, 2010, pp. 189-190.

36 Gill, R. (ed.) *The Cambridge Companion to Christian Ethics*, 2nd edition, Cambridge: Cambridge University Press, 2012. Chapter 16.

37 Weaver, J. 'Is there a Christian case for Nuclear Energy?' JRI Blog 9 August 2017. www.jri.org.uk/is-there-a-christian-case-for-nuclear-energy-by-rev-dr-john-weaver/.

should be scientifically savvy'.[38] Thankfully, the Anglican Community Science Commission (ACSC, formally launched 2022) assists the whole communion and faith leaders to embrace science and become confident to speak into the debate. According to Andrew Briggs, ACSC aims to equip Church bishops for 'leadership in issues involving science,' seeing science as God-given.[39] In its inaugural meeting video Archbishop Justin Welby spoke of the benefits of science. However, he remarks that the Church's reaction to science until today, has been very cautious. Or, he says 'there is fear …. We talk about all kinds of things that lead to people being frightened.'[40] My hope is that the ACSC will sensitively evaluate nuclear's merits.

This paper focuses on facts and evidence because ignorance of basic facts is widespread. I recognise that science alone may not change people's minds – fears, perceptions, ideology, politics, and worldviews are influencing factors. Further discussion occurs in Katharine Hayhoe's *Saving Us*, chapters 4-6 'The Facts Are the Facts,' 'The Problem with Facts,' and 'The Fear Factor'. I recognise that nuclear power and radiation may produce fear even though radioactivity is naturally occurring, as I have explained in my briefing paper.[41] Another reason I focus on facts is because of the prevalence of disinformation, explained by James J. McCarthy in 'Climate science and its distortion and denial by the misinformation industry'.[42]

Also, the prominent Christian atmospheric scientist, Sir John Houghton, while raising suitable questions on energy security with gas and nuclear, addressed nuclear's benefits.[43] Houghton, in his extensive work through the IPCC, briefing papers, conference speeches, books etc., has deeply influenced many, including this author. His autobiography *In the Eye of the Storm* admirably dem-

38 Legg, M. 'Nuclear fusion discovery promises clean energy: Why Christians should be scientifically savvy', 12 January 2023. www.denisonforum.org/current-events/science-technology/nuclear-fusion-discovery-promises-clean-energy-why-christians-should-be-scientifically-savvy/.

39 Anglican Community News Service. 'Anglican Communion Science Commission meets for the first time', 8 December 2021, www.anglicannews.org/news/2021/12/anglican-communion-science-commission-meets-for-the-first-time.aspx. Also see: Ashworth, P. 'Lambeth 2022: New Science Commission launched', *Church Times* 6 August 2022. www.churchtimes.co.uk/articles/2022/12-august/news/world/lambeth-2022-new-science-commission-launched.

40 ACNS – Anglican News Service. 'Scientists and theologians join forces for new Anglican Communion Science Commission', 21 May 2022, www.anglicannews.org/news/2021/05/scientists-and-theologians-join-forces-for-new-anglican-communion-science-commission.aspx.

41 See Dutch, R.S. *Natural Radioactivity, Radiation Exposure and Our Environment*, JRI Briefing Paper No. 37 July 2018, www.jri.org.uk/wp-content/uploads/2018/08/BP37_Natural_Radioactivity_Dutch.pdf.

42 McCarthy, J.J. 'Climate science and its distortion and denial by the misinformation industry', in White, R.S. (ed.) *Creation in Crisis: Christian Perspectives on Sustainability*, London: SPCK (2009), pp. 34-52.

43 Houghton, J. *Global Warming*: *The Complete Briefing*, 5th edition, Cambridge: Cambridge University Press (2015), p. 301.

onstrates communicating climate science.[44]

In September 2019, the prominent Christian climate scientist Katharine Hayhoe was named by the United Nations Environment Programme as a Champion of the Earth.[45] Further, on 1st June 2021 she began her role as the Chief Scientist for The Nature Conservancy (TNC).[46] She takes a less positive view of nuclear energy. In *Saving Us* she comments on reactors in the US and UK, concluding that despite their enthusiasts they are not 'the all-encompassing antidote.'[47] And I agree but nuclear merits a place with renewables. Further, she states the US has not constructed new nuclear plants in thirty years – citing the failed attempt in South Carolina. But she has overlooked the construction of two AP1000 reactors in Georgia: Plant Vogtle units 3 and 4 – scheduled to produce power in 2023 and 2023/24 respectively and generate enough electricity for 500,000 homes and businesses. Plant Vogtle is part of achieving net zero by 2050 by preventing around 10 million tons of carbon dioxide emissions annually.[48] These reactors will operate for 60 to 80 years.

As mentioned, Hayhoe is the Chief Scientist for the NC which published its helpful 2022 report *The Science of Sustainability.* This investigates 'Two Paths to 2050' using the 17 measures of the UN's SDGs: a vision of 'a world where all people are fed, healthy, employed, educated, empowered and thriving, but not at the expense of other life on Earth.'[49] The report examines climate, energy, and air pollution under two scenarios: 'Business-as-usual' and 'Sustainable Path'. The Business-as-usual energy portfolio has: fossil fuels (76%), renewable energy (16.2%) and nuclear energy (7.8%). The Sustainable Path scenario has the following worldwide values by 2050: fossil fuels (13%), renewable energy (54%) and nuclear energy (33%). This mitigation from fossil fuels to renewables and nuclear energy has two advantages: 'First, it lowers the rate

44 Houghton, J., with Tavner, G. *In the Eye of the Storm: The Autobiography of John Houghton*, Oxford: Lion Books (2013).

45 AGU. 'Katharine Hayhoe Named United Nations' Champion of the Earth', Eos 100 (2019), doi.org/10.1029/2019EO133755.

46 TNC. 'Katharine Hayhoe', https://www.nature.org/en-us/about-us/who-we-are/our-people/katharine-hayhoe/ See her biography at BIO – Katharine Hayhoe; http://katharinehayhoe.com/biography/. Also Katharine Hayhoe - Every Reason to Care, Biologos 2021, https://biologos.org/podcast-episodes/katharine-hayhoe-every-reason-to-care.

47 *op.cit*., Hayhoe, pp. 170-171.

48 *op.cit*., Hayhoe, p. 169 footnote. See Bechtel. 'Building the future of carbon-free nuclear energy: Plant Vogtle Units 3 and 4', 2022, www.bechtel.com/projects/plant-vogtle-unit-3-4/. Also see: Georgia Power. 'Vogtle Unit 3 reaches 100 percent energy output for the first time', 29 May 2023. www.georgiapower.com/company/news-center/2023-articles/vogtle-unit-3-reaches-100-percent-energy-output.html.

49 TNC. The Science of Sustainability: Exploring a Unified Path for Development and Conservation, 13 October 2018. www.nature.org/content/dam/tnc/nature/en/documents/TNC_TheScienceOfSustainability_04.pdf.

at which greenhouse gases are flowing into the air, taking carbon projections down … compared to business-as-usual estimates …. Second, it would create a marked decline in air pollution and the amount of people subject to unhealthy air.'[50] TNC models show a reduction where half the world's population are exposed to poor quality air to just 7% of the world's inhabitants exposed in the Sustainable Path.

In 2023, Peter Bussey contributed in his Christians in Science blog: 'Nuclear power does not exclude or sideline wind generators and solar panels, but these have their own drawbacks and limitations. It is our human and Christian obligation to support all efforts that can provide energy that we need, but also preserve our planet for present and future generations!'[51] This beautifully summarises our situation. I consider that ignorance of basic facts, plus inexact presentations, and disinformation need challenging and church leaders need to be reliably informed to guide the flock in their charge, not out of fear but in love.

The International Energy Agency (IEA)

In 2014 and 2015, the IEA identified the important contribution of nuclear energy in preventing climate change stating using nuclear: 'has avoided the release of 56 Gt of CO_2 since 1971, equivalent to almost two years of global emissions at current rates.'[52] This demonstrates the misrepresentation from those who argue that nuclear is too late to mitigate climate change. Then in May 2019, the IEA published *Nuclear Power in a Clean Energy System*. Its first report on nuclear power in nearly two decades returned nuclear to the important worldwide energy debate. It recognises the significant role of nuclear power and hydropower as together globally they deliver three-quarters of low-carbon generation. Among its key findings is: 'Nuclear power is the second-largest source of low-carbon electricity today, with 452 operating reactors providing 2700 TWh [terawatt hours] of electricity in 2018, or 10% of global electricity supply.' The IEA recognises: 'Alongside renewables, energy efficiency and other innovative technologies, nuclear can make a significant contribution' to sustainable energy goals and energy security.[53] It states we cannot ignore nuclear.

50 *ibid*., p. 10.

51 Bussey, P. 'Nuclear power – fusion and fission', Christians in Science blog 3 January 2023. www.cis.org.uk/blog-3rd-jan-2023-nuclear-power-fusion-and-fission/

52 IEA. *Energy and Climate Change: World Energy Outlook Special Report*, OECD/IEA, 2015, p. 73, https://iea.blob.core.windows.net/assets/8d783513-fd22-463a-b57d-a0d8d608d86f/WEO2015SpecialReportonEnergyandClimateChange.pdf. This references a 2014 IEA report: *The Power of Transformation: Wind, Sun and the Economics of Flexible Power Systems*.

53 IEA. *Nuclear Power in a Clean Energy System*, Fuel report May 2019 pp. 3-4. https://iea.blob.core.windows.net/assets/ad5a93ce-3a7f-461d-a441-8a05b7601887/Nuclear_Power_in_a_Clean_Energy_System.pdf.. For the shorter report see Nuclear Power in a Clean Energy System – Analysis

Further, in 2021 the IEA issued *Net Zero by 2050: A Roadmap for the Global Energy Sector*.

In March 2022, following Russia's invasion of Ukraine, the IEA published *A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas*. Action 5 stated: 'Maximise generation from existing dispatchable low-emissions sources: bioenergy and nuclear.' Then, in June 2022, it published *Nuclear Power and Secure Energy Transitions: From Today's Challenges to Tomorrow's Clean Energy Systems*.[54] Its executive summary states nuclear: **'**can help make the energy sector's journey away from unabated fossil fuels faster and more secure' and 'Extending nuclear plants' lifetimes is an indispensable part of a cost-effective path to net zero by 2050.' Its *World Energy Outlook 2022* Flagship report recognises that Russia's invasion has caused 'a global energy crisis.' Moreover, in some countries nuclear is coming back into favour and there are lifetime extensions for current reactors, and announcements of new construction. The world's largest new build of nuclear is in China. The report indicates concern over the rising demand for critical materials used in clean energy technologies notably silver, silicon, and rare earth elements for wind turbines plus lithium for batteries. These materials are 'highly concentrated geographically.'[55]

In its informative *Electricity Market Report 2023*, the IEA recognised the joint role of renewables and reactors under the title 'Low emissions sources are set to cover almost all the growth in global electricity demand by 2025' commenting that over the next three years renewables and nuclear together: 'will dominate the growth of global electricity supply … meeting on average more than 90% of the additional demand.'[56]

The UK's nuclear industry

The remaining sections provide evidence from the UK, and worldwide, on the continued use of nuclear energy based on its merits at providing clean low-carbon energy and energy security**.** We need an electricity supply system that meets rising demands while functioning in extreme conditions.

- IEA Quote from Executive Director Fatih Birol, www.iea.org/reports/nuclear-power-in-a-clean-energy-system.

54 IEA. *Nuclear Power and Secure Energy Transitions: From Today's Challenges to Tomorrow's Clean Energy Systems*, June 2022, www.iea.org/reports/nuclear-power-and-secure-energy-transitions. Executive summary – A New Dawn for Nuclear Energy, June 2022, https://www.iea.org/reports/nuclear-power-and-secure-energy-transitions/executive-summary.

55 IEA. *World Energy Outlook 2022*, October 2022, pp. 47-48. https:/iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf

56 IEA. *Electricity Market Report 2023*, February 2023, p. 6. https://iea.blob.core.windows.net/assets/255e9cba-da84-4681-8c1f-458ca1a3d9ca/ElectricityMarketReport2023.pdf.

The UK has operated large nuclear power plants for many decades using Magnox reactors (now being decommissioned), Advanced Gas-cooled reactors (AGRs) and one Pressurised Water Reactor (PWR) at Sizewell B (East Suffolk). At its peak (around 1995) 25% of the nation's electricity was generated by firm and clean low-carbon nuclear energy in the days before renewables' rapid growth. Indeed, from 1983-1998 of the low carbon electricity supplied to the grid over 90% came from nuclear power.[57] This historic data shows the major contribution by nuclear power. If these plants had not operated the nation would have had more fossil-fired generation emitting more greenhouse gases and air pollution.

The AGRs are approaching, or have reached, the ends of their operating lives. Three plants are shutdown (with 6 reactors). The closure dates for the remaining AGRs were: Hartlepool and Heysham 1 (2024), Heysham 2 (2028), and Torness (2028). However, in March 2023, EDF announced it had a revised target date for Hartlepool and Heysham 1 of 2026. Nevertheless, this is subject to assessment by the independent Office for Nuclear Regulation (ONR).[58] But by 2028 all AGRs will be shutdown leaving only Sizewell B and Hinkley Point C operational. EDF has a programme to examine extending the operational lifespan of Sizewell B, from its current estimated closing date of 2035, to at least 2055.[59]

In May 2022, the UK generated about 15% of its electricity from nuclear compared with 25% in 1995. Some may see this as a triumph for renewables but the IEA's *Nuclear Power in a Clean Energy System* cautions: 'Despite the impressive growth of solar and wind power, the overall share of clean energy sources in total electricity supply in 2018, at 36%, was the same as it was 20 years earlier because of the decline in nuclear. Halting that slide will be vital to stepping up the pace of the decarbonisation of electricity supply.'[60] The 'IEA's Nuclear Fade Case' examines where nuclear in advanced economies may decline in the absence of investments in lifetime extensions or new build. Lifetime extensions are well worthwhile and have been agreed, or applied for, in the US.[61]

57 Roberts, T., & Clark, H. *Nuclear electricity in the UK: special feature*, p. 65. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/789655/Nuclear_electricity_in_the_UK.pdf.

58 Leggett, T. 'Extended life for two UK nuclear power stations', BBC News 9 March 2023, https://www.bbc.co.uk/news/business-64906179 . Also see ONR. 'EDF announces operating life extensions for Heysham 1 and Hartlepool', 9 March 2023, https://news.onr.org.uk/2023/03/edf-announces-operating-life-extensions-for-heysham-1-and-hartlepool/

59 EDF. 'Sizewell B starts review to extend operation by 20 years', 6 April 2022, www.edfenergy.com/media-centre/news-releases/sizewell-b-starts-review-extend-operation-20-years.

60 IEA. *Nuclear Power in a Clean Energy System*, Fuel report May 2019. This is the shorter version of the full report. www.iea.org/reports/nuclear-power-in-a-clean-energy-system.

61 WNN. 'Constellation seeks licence extensions for Illinois plants', 31 October 2022. www.world-nuclear-news.org/Articles/Constellation-seeks-licence-extensions-for-Illinoi.

From *Industrial Strategy* to *British Energy Security Strategy*

In 2017, the Government's *Industrial Strategy* White Paper identified Grand Challenges. Under 'Nuclear' it saw the sector as: 'integral to increasing productivity and driving growth.' It saw nuclear as low carbon power vital to our current and future energy mix.[62] Furthermore, the *British Energy Security Strategy: Secure, clean and affordable British Energy for the long term* (April 2022) focuses on future build with the Government planning large increases in renewables while aiming to approve a fleet of eight new reactors plus SMRs.[63] The strategy notes that nuclear supplies 15% of our electricity while it 'is the only form of reliable, low carbon electricity generation which has been proven at scale and returns more than a hundred times as much power as a solar site of the same size. We can only secure a big enough baseload of reliable power for our island by drawing on nuclear.'[64] The civil nuclear industry looks to be expanded with 24 GW by 2050 – 25% of projected electricity demand (which is likely to double today's capacity) and three times more than the current installed capacity. I am in favour of returning our nuclear capacity to 25% where it was previously.

A comprehensive strategy review by Chris Skidmore MP, *Mission Net Zero: Independent Review of Net Zero* (January 2023), reported that new nuclear power is: 'a no-regrets option' as power demand increases and current nuclear plants close. It agreed with the *British Energy Security Strategy* but stated it required more detail to ensure achievements plus nuclear deployment targets in 2035 not just 2050 to capitalise on future opportunities e.g. small modular reactors, advanced modular reactors, fusion and nuclear uses beyond the power sector. Furthermore, it recognises that new nuclear plants are a no-regrets option, even considering their upfront costs and lengthy construction periods.[65] In March 2023, the Government's two *Powering up Britain* documents explained its plans, including more nuclear, for ensuring energy security.[66] And the Gov-

62 HM Government. *Industrial Strategy: Building a Britain fit for the future*, White Paper Cm 9528, 27 November 2017, p. 206, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/730043/industrial-strategy-white-paper-print-ready-a4-version.pdf

63 HM Government. *British Energy Security Strategy: Secure, clean and affordable British Energy for the long term*, Policy paper, April 2022, pp. 20-21. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1069973/british-energy-security-strategy-print-ready.pdf.

64 *ibid*., p. 20.

65 Skidmore, C. *Mission Net Zero: Independent Review of Net Zero*, 13 January 2023, pp. 94-95. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1128689/mission-zero-independent-review.pdf. For a summary, see: Brader, C. *In Focus: Mission zero: Independent review of net zero*, House of Lords Library 20 January 2023. https://lordslibrary.parliament.uk/mission-zero-independent-review-of-net-zero/.

66 Department for Energy Security and Net Zero. 'Powering up Britain', Policy Paper last updated

ernment had classified nuclear as green.

Hinkley Point C and Sizewell C Power Stations

Currently, EDF and China General Nuclear (CGN) are building Hinkley Point C (HPC) in Somerset which has two European Pressurised Reactors (EPRs) of 1630 MWe each. HPC will supply reliable low-carbon energy to meet 7% of the country's electricity needs – enough for around six million homes. Over its 60-year lifespan it will avoid 600 million tonnes of carbon dioxide emissions – thus helping achieve Net Zero.[67] Emissions during the construction of HPC are small compared to its operation over a 60-year life. EDF and CGN's Net Zero Report states, in a comparison with burning gas, HPC 'will take just 60 days to avoid the equivalent amount of carbon dioxide released during its 10-year build.' Moreover, using 'a more sustainable cement substitute' has reduced emissions from concrete production.[68]

EDF and CGN's report *Hinkley Point C: Socio-economic Impacts Report* (2021) highlights its benefits to the local community (e.g. secure skilled jobs) and country. Furthermore, EDF commissioned an important lifetime carbon assessment for HPC by environmental specialists Ricardo Energy & Environment which was verified by engineering consultants. The study showed that HPC would be cleaner than renewables.[69] The conclusions were in line with a report from the United Nations Economic Commission for Europe (UNECE).[70] A similar life cycle analysis study by EDF on France's reactor fleet showed that the emissions were very low carbon. France's use of nuclear, with 56 operational reactors, and renewables means its electricity is 97% CO_2-free.[71] HPC unit 1 is expected to generate electricity in June 2027. With its 60-years life that will take unit 1 until 2087 and a possible lifetime extension of 20 years. What about waste? EDF explains that the large reactor core design optimises fuel usage

4 April 2023, www.gov.uk/government/publications/powering-up-britain.

67 See EDF. 'About Hinkley Point C'. www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/about.

68 EDF & CGN. Hinkley Point C: Creating a positive environmental impact, November 2021, pp. 5, 8. www.edfenergy.com/sites/default/files/hinkley_point_c_-_creating_a_positive_environmental_impact._november_2021.pdf.

69 EDF. Life cycle carbon and environmental impact analysis of electricity from Hinkley Point C nuclear power plant development, ED 13018102, Final Report, Issue number 1, 26 October 2021, https://www.edfenergy.com/sites/default/files/hpc_-_life_cycle_carbon_and_environmental_impact_analysis._november_2021.pdf. Summary at: WNN. 'Hinkley Point C cleaner than renewables, study shows', 22 November 2021, https://tinyurl.com/343ps6vh.

70 UNECE. *Life Cycle Assessment of Electricity Generation Options*, 2021, www.unece.org/sites/default/files/2021-10/LCA-2.pdf.

71 WNN. 'EDF study confirms very low carbon nature of nuclear', 20 June 2022, www.world-nuclear-news.org/Articles/EDF-study-confirms-very-low-carbon-nature-of-nucle.

using less uranium and producing less long-lived radioactive wastes compared with today's water reactors. Almost a third-less long-lived radioactive wastes will be produced.[72]

Sizewell C (SZC) in East Suffolk will be a near replica of HPC. In January 2020, the UK Government committed £100 million to SZC. Then in its December 2020 Energy White Paper, it committed to a Final Investment Decision for at least one more large-scale nuclear plant, after Hinkley Point C, by December 2024. Moreover, in September 2021, 48 UK unions called for more rapid progress to be made in new nuclear build at SZC and on previously stalled projects. They also called for development of SMRs.[73] In late 2022, SZC was granted planning permission and in November 2022 the Government became a 50% partner with EDF which is expected to make a final investment decision in 2023.

Sizewell C's *Our Commitments to Britain* addresses nine commitments.[74] Under No.5 'Clean' it shows how nuclear needs a much smaller land area than wind and solar sources. Once operational, SZC will use 33 hectares of land while, to produce the same electricity, solar panels require 30,000 hectares and wind turbines 90,000 hectares. A previous comparison with land usage was made by the Campaign to Protect Rural England (CPRE) about meeting our 2050 target (then an 80% reduction in emissions). It advocated developing a sustainable energy system that did not destroy the countryside.[75]

SZC aims to go beyond electricity production and offer cogeneration in a low-carbon energy hub with opportunities for clean hydrogen production, direct air capture (DAC) of carbon dioxide and production of clean aviation fuel**.** With DAC, the captured carbon dioxide can be combined with hydrogen to make synthetic fuels. Following research and development a consortium is prepared to build a demonstration plant and foresees the full-scale plant removing 1.5 million tonnes of CO_2 per year – equivalent to almost offsetting 'the UK's entire

72 EDF. 'About Hinkley Point C: Frequently asked questions - How will you deal with the waste from Hinkley Point C?' www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c/about.

73 WNN. 'UK unions call for government backing of new build projects', 14 September 2021, www.world-nuclear-news.org/Articles/UK-unions-call-for-government-backing-of-new-build.

74 EDF Energy. Sizewell C: Our Commitments to Britain, 2021, p. 2. https://tinyurl.com/485c5yvw. Also YouTube video at: What is Sizewell C and what does it mean for the UK? https://www.youtube.com/watch?v=IInLLuysAR0

75 CPRE. *Warm and Green: Achievable affordable, low carbon energy while reducing impacts on the countryside*, April 2015, pp. 29-31. www.cpre.org.uk/resources/warm-and-green/. Also see: Helm, D. Green and Prosperous Land: A Blueprint for Rescuing the British Countryside (2019) www.dieterhelm.co.uk/natural-capital/environment/introduction-to-green-and-prosperous-land-a-blueprint-to-rescuing-the-british-countryside/ and his video at Introduction to Green and Prosperous Land: A Blueprint for Rescuing the British Countryside. www.dieterhelm.co.uk/natural-capital/environment/introduction-to-green-and-prosperous-land-a-blueprint-to-rescuing-the-british-countryside/

emissions from railway transport.'[76] The plant may also supply district heating.

Small modular reactors (SMRs)

The World Nuclear Association's (WNA) description of SMRs defines them as nuclear reactors: 'generally 300 MWe equivalent or less' using module factory build, series production to reduce costs and reduced construction times.[77] Nevertheless, some SMRs are larger. In *Let There Be Light!* I discussed SMRs as potential future reactors and noted that a House of Lords Science and Technology Commission, in October 2016, criticised the Government for its inaction on civil nuclear power. Since then, interest has grown internationally. Interestingly, SMRs are not entirely new as often perceived – they were developed and deployed by the US mainly for electricity and heat in the 1950s/60s in remote locations during the Cold War. Moreover, these modular reactors supplied drinking water and avoided using vast volumes of polluting diesel fuel. After use they were safely dismantled and decommissioned.[78]

On 19 January 2022, the UK parliament debated 'Small Modular Reactors and Energy Security.' Virginia Crosbie, conservative Member of Parliament for Ynys Môn (Anglesey), Wales highlighted the merits of SMRs with three principal reasons: (1) modular construction should remove previous issues with large nuclear plants, for example, financing, and long construction times, (2) they offer energy security with low-carbon energy, and (3) they provide a new industrial revolution – levelling up, high-skilled jobs and supply chains.[79]

SMRs have unique features and benefits. Rolls-Royce SMR Ltd (a consortium of companies) plans to build a fleet of 16 SMRs in the UK using small pressurised water reactors (PWRs). The design has four key elements: (1) low cost, (2) deliverable, (3) global & scalable, and (4) investable. SMRs will be built from modular units made in dedicated factory conditions before site assembly. Around 90% of the manufacturing and assembly activities will be made in these factories so producing high-quality products and reducing risks with on-site construction. The technology includes the whole nuclear power plant with: 470 MWe low-carbon electricity powering around one million homes (equivalent to over 150 onshore wind turbines and enough power for a city the size

76 WNN. '"Megatonne" CO2 capture plant plan for Sizewell C', 15 June 2022. https://tinyurl.com/2xtmv6y7.

77 WNA. 'Small Nuclear Power Reactors', updated January 2023, www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/small-nuclear-power-reactors.aspx.

78 Salisbury, M. 'The frosty history of the first SMRs ever built…in the 1950s/60s', *Nuclear Future* (2021) 17(6), 20-23.

79 UK Parliament. *Small Modular Reactors and Energy Security*, Hansard - UK Parliament debated 19 January 2022. https://hansard.parliament.uk/commons/2022-01-19/debates/D95C81CC-F4B1-420C-A53A-625A9AF82C1F/SmallModularReactorsAndEnergySecurity.

of Leeds); reliable baseload energy for at least 60 years; provision for green (clean) hydrogen production and synthetic fuels; a land footprint one-tenth of a conventional nuclear plant; factory construction of modules; thousands of regional jobs and economic benefits.[80] In April 2023, the Rolls-Royce SMR design completed Step 1 (initiation) and entered Step 2 (fundamental assessment) of the UK's Generic Design Acceptance (GDA) undertaken by the UK's independent regulators: the Office for Nuclear Regulation, the Environment Agency and Natural Resources Wales. During Step 2 people are invited to 'have their say' on the dedicated Rolls-Royce website.[81]

Nuclear fusion – a distant hope

The UK Government's *Ten Point Plan* indicates it wants to commercialise fusion energy technology and the Government issued *Towards Fusion Energy: The UK Government's Fusion Strategy* (October 2021). Further, its *Green Paper: Towards Fusion Energy* (2021) addresses a regulatory framework and introduced a consultation.[82] A commercial prototype plant is to be built at West Burton in Nottinghamshire with anticipated operation in the early 2040s.[83] This will be the Spherical Tokamak for Energy Production (STEP). So, fusion will have little impact on achieving net zero by 2050 but there are current economic benefits alongside long-term benefits of commercial viability. Nevertheless, fusion research in the US during late 2022 has shown it is possible to generate more energy than the energy put in, although scaling up from a prototype to a commercial power station is a major step.

An international perspective post-Fukushima

Readers will be aware of the international decisions that were made after the Fukushima accident, particularly the decision by Germany to phase-out its nuclear plants. However, since then there has been a resurgence of interest in

80 Rolls-Royce SMR Ltd. 'Small Modular Reactors', 2022. https://www.rolls-royce.com/innovation/small-modular-reactors.aspx#section-smr-build.

81 ONR. 'Rolls-Royce SMR', 13 April 2023. www.onr.org.uk/new-reactors/rolls-royce/index.htm. The timeline for Step 2 is until July 2024 after which the final Step 3 begins. Rolls-Royce SMR. 'Rolls-Royce SMR Generic Design Assessment (GDA)', 2023, https://gda.rolls-royce-smr.com/.

82 BEIS. *Towards Fusion Energy: The UK Government's response to the consultation on its proposals for a regulatory framework for fusion energy*, June 2022, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1084472/towards-fusion-energy-uk-government-response.pdf.

83 Roe T., & A. Smith. 'Nuclear fusion plant to be built at West Burton A power station', BBC News 3 October 2022. www.bbc.co.uk/news/uk-england-nottinghamshire-63119465.

building new nuclear plants and life extensions for operating plants, in order to achieve net zero and energy security. Extensive information is provided by the IEA's *Electricity Market Report 2023*. Here, I provide a few examples.

Some countries do not operate nuclear power plants. Greece has chosen not to build nuclear reactors because of the earthquake risk but it is working towards nuclear cooperation with Bulgaria on a long-term supply contract. Bulgaria's two reactors supply around one-third of the country's electricity but it has plans to build more.[84]

The contrasts in Europe are evident in the different decisions made by France and Germany. Nevertheless, after much discussion and debate, the EU's European Taxonomy includes nuclear (and gas) as 'green investments'.[85] The UK's religion and society think tank, Theos in *Reflections on COP26*, includes A. McIntosh's observation: 'Decarbonising energy is the biggest challenge, and even here, it is hard to do the right thing.' He notes: 'Germany chose to get rid of nuclear, but now its carbon footprint is nearly double that of neighbouring France, and the carbon intensitivity [spelling in the original] of its coal-generated electricity is nine times that of nuclear France.'[86] Further, Germany has a high dependency on gas even with all its renewable energy. After the Fukushima accident it began closing its nuclear stations with all to close by the end of 2022, but after Russia invaded Ukraine, it reviewed its position for power in the winter 2022/23. The country's three remaining nuclear plants were allowed to operate until April 2023 when they were permanently shutdown.[87]

Examples of countries that are building, or planning to build, new nuclear plants (with large reactors and SMRs) include Canada, China, the Czech Republic, Finland, France, India, Poland, Russia, South Korea, United Arab Emirates, UK, and the USA. In April 2023, Finland's latest reactor, the 1,600 MWe Olkiluoto 3 (OL3) European Pressurized Water (EPR), after very many delays, started supplying electricity, providing 15% of the country's total electricity.[88]

Finally, it is of interest to note developments in Japan. Despite the Fukushima accident, the nation recently changed its nuclear policy. The Green Trans-

84 WNN. 'Bulgaria planning for nuclear cooperation with Greece', 22 March 2022, www.world-nuclear-news.org/Articles/Bulgaria-planning-for-nuclear-cooperation-with-Gre.

85 WNN. 'European Parliament backs nuclear and gas in EU taxonomy', 6 July 2022, https://www.world-nuclear-news.org/Articles/European-Parliament-backs-nuclear-and-gas-in-EU-ta.

86 McIntosh, A. 'COP26 as a ritual space', in Pennington, M., Christie, I. (Eds.). *Reflections on COP26: What Does Theology Have to Offer the Conversation around the Climate Crisis?* Theos report 2022, p. 71. www.theosthinktank.co.uk/cmsfiles/Climate-Crisis-report.pdf.

87 WNN. 'German cabinet approves extended reactor operations', 20 October 2022, www.world-nuclear-news.org/Articles/German-cabinet-approves-extended-reactor-operation.

88 WNN. 'TVO accepts Olkiluoto EPR ahead of commercial operation', 20 April 2023, www.world-nuclear-news.org/Articles/TVO-accepts-Olkiluoto-EPR-ahead-of-commercial-oper.

formation (GX) Executive Committee has considered major changes including energy and Japan's Cabinet approved a new policy. The features include seeing nuclear power as 'a power source that contributes to energy security and has a high decarbonisation effect.' Japan will restart as many reactors as possible and extend the operating life of older ones.[89]

What about nuclear waste?

I provide a discussion on waste in chapter 6 of *Let There Be Light!* There, I noted that in the US high-level radioactive waste storage has continued since 1999 at the Waste Isolation Pilot Plant (WIPP). It is a deep underground facility, in a salt bed, for US military waste and not civil nuclear waste. But it demonstrates that high-level radioactive waste has been permanently disposed.

Bussey (see above) in his Christians in Science blog recognises the need to store radioactive waste underground for very long periods adding there is 'no compelling reason why this cannot be done.' Indeed. In Finland, the world's first deep geological disposal facility (GDF) – around 450 m underground – has already been built for civil nuclear waste and further information on this is available.[90] Further, France's national radioactive waste management agency Andra has applied to the regulator for the review of a deep repository for high-level radioactive waste, that is long-lived, and intermediate-level waste.[91]

The UK Government's progress on developing a GDF is available in the Nuclear Waste Services (NWS) report: *GDF Annual Report 2020-2021*.[92] Local communities have demonstrated an interest in hosting a GDF, so three Community Partnerships have been set up and one Working Group. And a new strategy produced by the NWS aims to make this waste 'permanently safer, sooner'.[93]

What about waste produced by SMRs? One recent study has suggested that

89 WNN. 'Cabinet approves change in Japanese nuclear policy', 10 February 2023, www.world-nuclear-news.org/Articles/Cabinet-approves-change-in-Japanese-nuclear-policy.

90 Sky News. Inside the world's first nuclear waste tomb in Finland, www.youtube.com/watch?v=0gLia6uyzBU. Also see: Nuclear Waste Services. 'NWS hosts Sky News visit to world's first GDF in Finland', 18 October 2022, www.gov.uk/government/news/nws-hosts-sky-news-visit-to-worlds-first-gdf-in-finland. Gil, L. 'Finland's Spent Fuel Repository a "Game Changer" for the Nuclear Industry, Director General Grossi Says', 26 November 2020, www.iaea.org/newscenter/news/finlands-spent-fuel-repository-a-game-changer-for-the-nuclear-industry-director-general-grossi-says.

91 WNN. 'Application for French repository accepted for review', 23 June 2023. www.world-nuclear-news.org/Articles/Application-for-French-repository-accepted-for-rev.

92 NWS. 'GDF Annual Report 2020-2021', 18 February 2022, www.gov.uk/government/publications/gdf-annual-report-2020-2021.

93 NWS. 'Nuclear Waste Services launches strategy that will make nuclear waste permanently safe, sooner' News story 25 April 2023, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1154015/NWS_CorporateStrategy_Report_2023.pdf.

waste would be increased but this study is limited to five reactor designs. Mark Shwartz's article 'Stanford-led research finds small modular reactors will exacerbate challenges of highly radioactive nuclear waste', outlines the research and its conclusion that: 'overall, small modular designs are inferior to conventional reactors with respect to radioactive waste generation, management requirements, and disposal options.'[94] However, a blog by expert Kirk Sorensen, called 'PNAS SMR waste study rebuttal' has challenged the conclusions and demonstrates deficiencies in the research.[95]

So, progress continues. What particularly concerns the author is the millions of tonnes of carbon dioxide released continually into our atmosphere and now uncontrollably 'stored' in our oceans thus affecting acidity, biodiversity and sea level rise that is, and will, impact people inhabiting small islands, coastal regions, and cities, e.g. in Bangladesh. If we love God and our neighbours then we should help, as Jesus illustrated in his parable of the Good Samaritan.

Air pollution

One of the many benefits of replacing fossil fuels with nuclear energy and renewables is improved air quality. In a 2013 report, *Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power*, climate scientists James E. Hansen and Pushker A. Kharecha demonstrated from historical data that using global nuclear energy instead of burning fossil fuels had 'prevented an average of 1.84 million air pollution-related deaths and 64 gigatonnes of CO_2-equivalent ($GtCO_2$-eq) greenhouse gas (GHG) emissions' and future use of nuclear would prevent further deaths.[96] Germany's switch from nuclear power to more fossil-fuelled plants means that increased local air pollution around these plants has resulted in increased deaths, as demonstrated in the December 2019 working paper *The Private and External Costs of Germany's Nuclear Phase-Out* by Stephen Jarvis, Olivier Deschenes and Akshaya Jha. They analyse annual financial costs and comment that 70% of the costs arise from '1,100 excess deaths per year resulting from the local air pollution emitted by the coal-fired power plants operating in place of the shutdown nuclear plants.'[97]

94 Shwartz, S. 'Stanford-led research finds small modular reactors will exacerbate challenges of highly radioactive nuclear waste', 30 May 2022. https://news.stanford.edu/2022/05/30/small-modular-reactors-produce-high-levels-nuclear-waste/.

95 Sorensen, K. 'PNAS SMR waste study rebuttal', Blog 1 June 2022. www.energyfromthorium.com/2022/06/01/pnas-smr-rebuttal/.

96 Kharecha, P.A., & Hansen, J.E. 'Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power', Environ. Sci. Technol. 2013, 47(9) 4889–4895. Also see: Hansen, J. & Pushker, P. Greens for Nuclear Energy, 2020, www.greensfornuclear.energy/james-hansen-phd-pushker-kharecha-phd/.

97 Jarvis, S., Deschenes, O., & Jha, A. *The Private and External Costs of Germany's Nuclear*

Recent research, led by Harvard University with collaboration from University College London and Leicester University, reported: 'Fossil fuel air pollution responsible for 1 in 5 deaths worldwide.' The study's authors observe that much of the debate on climate change focuses particularly on carbon dioxide emissions but they urge policy makers etc., to consider air quality and 'prevent many more millions of needless deaths.' In short, their work: 'shows that more than 8 million people around the globe die each year as a result of breathing in air containing particles from burning fuels like coal, petrol and diesel, which aggravate respiratory conditions like asthma and can lead to lung cancer, coronary heart disease, strokes and early death.' This is often an unrecognised high risk requiring swift action.[98] Wood burning stoves too contribute to air pollution.

In Ontario (Canada) electricity generation in 2019 comprised: nuclear (61%), hydro (24.5%), wind (7.4%), gas (6.4%), biofuel (0.45%) and solar (0.25%). So, more than 90% of electricity supplied was from 'non-emitting sources', for example, nuclear and hydro plus some renewables (wind and solar). Refurbished nuclear plants helped remove coal from its mix from 2014. Moreover, Bruce Power's nuclear units provide 'flexible, dynamic capability.' Emission intensity (measured as gCO2e/kWh) from the electricity sector shows that Ontario emits less GHGs than California and much less than Germany (almost 10 times higher than Ontario despite high investments in renewables). Ontario has cut emissions and has low-cost electricity for its consumers. Moreover, improved air quality limits 'emergency room visits, illness and hospital admissions, resulting in a financial benefit of $2.6 billion annually.'[99]

The value of nuclear in reducing air pollution remains largely unrecognised. Also largely unrecognised are the medical benefits provided by large reactors and research reactors in the production of radioactive sources for use in radiotherapy cancer treatments, sterilisation of medical equipment, and radioisotopes for diagnosis and treatments.

Conclusions

This paper provides an evidence-based overview of nuclear energy's place in achieving net zero and national security. It focuses on challenging, complex areas and the crucial role of electricity production and cogeneration. It is a plea

Phase-Out, National Bureau of Economic Research, December 2019, p. 31, https://nber.org/system/files/working_papers/w26598/w26598.pdf.

98 'Fossil fuel air pollution responsible for 1 in 5 deaths worldwide'. UCL News, University College London, 9 February 2021, www.ucl.ac.uk/news/2021/feb/fossil-fuel-air-pollution-responsible-1-5-deaths-worldwide.

99 BrucePower. *The Ontario Energy Report*, 2019, pp. 3, 10. www.brucepower.com/wp-content/uploads/2020/01/2020_OntarioEnergyReport-1.pdf.

for understanding, wisdom and love in action while not remaining silent on climate change solutions. Nuclear power is not solely about technology but importantly about our planet and people including those working in the industry and supply chains, Christians, and non-Christians alike. These people should be respected in honest conversations, treated as loved by God and invited to speak so that others can benefit from their firsthand experience while also listening to evidence-based arguments on nuclear energy's merits. Many Christian leaders may lack qualifications and understanding in science and technology but it is essential that Christian churches and organisations endeavour to link science, faith, and the environment in an objective assessment of the relative merits and risks of firm, clean, and low-carbon nuclear power in order to guide and equip their congregations. However, we can cope with challenging circumstances in hope. Indeed, early Christians lived in a very different and difficult context – the Roman Empire – where their leader Jesus had been crucified but they boldly proclaimed his resurrection and eternal life.

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Galilei and Kepler on the Mathematical Beauty of the World as a Divine Gift

The Scientific Revolution transformed the teleological view of the universe into a quantitative vision in which measurements play a key role in our understanding of nature. The contribution offered by Christian theology for achieving that new approach is well evidenced: the major protagonists of the modern scientific revolution, indeed, considered the universe to be a mathematical structure as the outcome of divine creation. Humans, in turn, are provided by God with mathematical archetypes for understanding the inner nature of the world, as an integral part of revelation. This paper focuses on the ideas expressed by Galileo Galilei and Johannes Kepler on the geometrical harmony of creation as a divine gift.

Keywords: Johannes Kepler, Galileo Galilei, science and faith, mathematical universe, Scientific Revolution, Christian origin of science, Book of Nature, Creation, God's design.

Scriptures and the harmonic universe

The belief in a universal mathematical harmony represents a common ground for the thinkers that opened the way for the achievements of exact science. However, historians of modern thought often disregard the notion that the harmonical universe is celebrated in the Scriptures as the outcome of actions performed by God. Although the main Christian confessions reject any kind of concordism, and despite the distinction between theological approaches and scientific discourse, the biblical message offers a coherent view of the world. According to the etymological origin of the term (*unum in diversis*), the Bible presents the universe as a coherent totality. The sameness of phenomena and the human ability to interpret them share God as their same origin; the appropriate metaphor of the two books, nature and Scriptures, that inspired many modern authors, clearly suggests the inner rationality and readability of the created reality.

The effect of the Divine Mercy providing natural reality with intelligibility, can be found in Psalm 136:4-9, in which the 'skillful' creation of the earth and heavenly bodies highlights that 'God's love endures forever.'[1] In the book of Jeremiah, the existence of human beings, as beneficiaries of Revelation, is closely

1 In this paper the Scriptural quotes are taken from: *The New American Bible*. Nashville – Atlanta – London – Vancouver: Catholic Bible Press (1987).

linked to the order guaranteed by natural laws. 'Thus says the LORD, He who gives the sun to light the day, moon and stars to light the night; Who stirs up the sea till its waves roar, whose name is LORD of hosts: If ever these natural laws give way in spite of me, says the LORD, Then shall the race of Israel cease as a nation before me forever.' (Jer. 31:35-36)

So natural laws are arranged within a broader theological dimension, highlighting the magnificence and unity of creation. In Sirach, a Deuterocanonical book of the Old Testament, the outstanding natural beauty is revealed as an objective quality that humans can contemplate in all its greatness. 'The clear vault of the sky shines forth like heaven itself, a vision of glory. The orb of the sun, resplendent at its rising: what a wonderful work of the Most High! […] Great indeed is the LORD who made it, at whose orders it urges on its steeds. […] The beauty, the glory, of the heavens are the stars that adorn with their sparkling the heights of God, at whose command they keep their place and never relax in their vigils.' (Sir 43:1-10) Scientific investigation starts with a registering of reality, whose analogical order is presupposed by natural researchers, who found their own activity on the commonality of phenomena. In the Deuterocanonical Book of Wisdom, contemplation of created reality is deemed to be the path to grasp God as the source of universal beauty. 'For from the greatness and the beauty of created things their original author, by analogy, is seen.' (Wis 13:5)

The specificity of science consists in systems of equations relating to the regularity of natural phenomena, and the quantitative approach is analogically based on the order and coherence of matter. Highlighting this basic presupposition is the goal of the passage in the Book of Wisdom, where it is announced that 'You have disposed all things by measure and number and weight.' (Wis 11:20) These words clearly show the goodness of creation as a necessary precondition of an incipient scientific approach. So, the quantitative ordering of nature entails the cultivation of mathematical subject-matters. Moreover, Wis 11:20 anticipated the modern conception of the regularity of physical laws, according to which every phenomenon can be exactly measured. In the beginning of time, the Creator imposed a mathematical regularity on physical phenomena as the core of a predetermined order.

Many authors of the Christian tradition base their natural philosophy on the idea of a sapiential creation. In Augustine of Hippo's works, for example, the identity between Word and Wisdom sees the world order as part of God's providential design. Perceiving the vestiges of God means reading the beauty of creation as a mark of universal truth. Augustine understands the harmony of creation in terms of an ordered proportion, because eternal ideas are instantiated in matter. Put in other terms, the impressed forms call the intentional disposition of mind to understand the transcendent God as the origin of the universal beauty. The book of nature, as the outcome of creation, speaks to human beings and announces the glory of God (Ps 18:2). 'Some people, in order to discover God, read a book. But there is a great book: the very appearance

of created things. Look above and below, note, read. God whom you want to discover, did not make the letters with ink; he put in front of your eyes the very things that he made. Can you ask for a louder voice than that?'[2]

All those characteristics of the Biblical cosmos deeply impacted the scientific community in the XVI and XVII centuries. The celebration of the divine wisdom in designing everything resulted in the belief in a world that constantly displays its inner mathematical regularity. Furthermore, the stability of the universal harmony means the undeniable validity of God's action. The mathematical understanding of nature, as a hallmark of the Scientific Revolution, replaced the teleological arrangement of the world, dating back to the Aristotelian philosophy. The traditional conception, indeed, considered natural phenomena as goal-oriented processes aiming at achieving their inherent purpose. The shift from such an organismic worldview to a mechanistic universe was not immediate, as it was the outcome of the ongoing evolution of thought that started in the Medieval Age. The theory of impetus, formulated in the first half of the Fourteenth Century by the Scholastic philosopher John Buridan, anticipated the modern principle of inertia and represented a key step for the achievement of the laws of motion.

Although the Heliocentric theory incorporated both traditional and original assumptions, Kepler and Galilei welcomed it, not only for the removal of the earth from the centre of the planetary system, but mostly for the mathematical peculiarity of Copernican cosmology. Similarly to what Copernicus had done, they embraced a geometrical realism as a core belief in a harmonic universe. Consequently, in their opinion, the unalterable structure of creation entailed the impossibility of introducing mathematical solutions only to save appearances. The mathematizing of the universe in the modern age can be evaluated as the turning point towards exact science. Galilei's and Kepler's visions of science and natural theology offer a substantial contribution to this point of view.

The book of nature in Galilei's writings

Philosophy is written in this grand book which is continually open before our eyes – I mean the Universe – but before we can understand it we need to learn the language and recognize the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a word of what it says. Without these, it is just wandering aimlessly in a baffling maze.[3]

This is probably the most famous of Galilei's statements, and its interpreta-

2 Augustine of Hippo, *Sermones* 68,6.

3 Galilei, G. *Selected Writings*. Oxford: Oxford University Press (2012), p. 115.

tion would be enough to understand the scientific program developed by the Italian scientist. Being far from any kind of science aimed only at saving phenomena, his mathematical realism exalts the harmonical universe shaped by God. Therefore, mathematics is seen as the divine language that guarantees to human beings the full intelligibility of creation. That metaphor was generally adopted by modern thinkers to emphasize that both of the books, nature and Scripture, come from the Creating Word. In accordance with the modern sense of the metaphor, mathematics constitutes the only reliable language for a coherent approach to phenomena. So mathematical precision confers nature with a beauty leading us to recognize God behind that indubitable harmony. A sort of ideal relationship between God and man is established on the basis of a cosmological language, rendering the world a harmonical reality. In the light of that principle, cosmology is integrated into a theological dimension, allowing scientists to keep their devotion to the Creator.

In the end of the first day of his *Dialogue Concerning the Two Chief World Systems*, Galilei defines more specifically the nature of mathematical knowledge. His vision keeps the unbridgeable gap between God and his privileged creature: while divine knowledge is total and immediate, the human understanding is a limited ongoing process needing time. Anyway, 'I do not thereby abase it so much as to consider it absolutely null. No, when I consider what marvellous things and how many of them men have understood, inquired into, and contrived, I recognize and understand only too clearly that the human mind is a work of God's, and one of the most excellent.'[4]

Human knowledge highlights its inferiority to the divine, but the possibility of comprehending the beauty of the mathematical structure of the world undoubtedly shows that the knowledge of exact physical laws forms part of the divine design for humanity. Investigating that universal harmony represents a gift of the divine mercy, as one can read in the dedication of the same *Dialogue* to the Grand Duke Ferdinand II.

He who looks the higher is the more highly distinguished, and turning over the great book of nature (which is the proper object of philosophy) is the way to elevate one's gaze. And though whatever we read in that book is the creation of the omnipotent Craftsman, and is accordingly excellently proportioned, nevertheless that part is most suitable and most worthy which makes His work and His craftsmanship most evident to our view. The constitution of the universe I believe may be set in first place among all natural things that can be known. [5]

That is the reason why, in the conclusion of the *Dialogue*, Salviati, that is Galilei's spokesman, highlights that scientific research should remain within

4 Galilei, G. *Dialogue Concerning the Two Chief World Systems*. Berkeley and Los Angeles: University of California Press (1967), p. 104.

5 *ibid*., p. 3.

the scientific approach and cannot penetrate the divine mysteries. In simple words, Divine Grace has shaped our minds to enable us to investigate the structure of the universe; therefore, restricting our study into the quantitative realm and avoiding delving into supreme mysteries, represent basic points of the God-man relationship.

An admirable and angelic doctrine, and well in accord with another one, also Divine, which, while it grants to us the right to argue about the constitution of the universe […] adds that we cannot discover the work of His hands. Let us, then, exercise these activities permitted to us and ordained by God, that we may recognize and thereby so much the more admire His greatness, however much less fit we may find ourselves to penetrate the profound depths of His infinite wisdom.[6]

Beyond any kind of Aristotelian distinction between heavenly and elementary realms, Galilei considers the universe as an entangled reality in which scientific knowledge and religion overlap. So, God's rule over the world and his intervention in human life rejects any pantheist ideas and promotes coming to Him through the scientific investigation of nature. According to the father of modern science, even technological advances form part of God's providential plan; his own telescope, indeed, is not an exception. 'In our time it has pleased God to concede to human ingenuity an invention so wonderful as to have the power of increasing vision four, six, ten, twenty, thirty, and forty times, and an infinite number of objects which were invisible, either because of distance or extreme minuteness, have become visible by means of the telescope.'[7] A similar meaning can be found in the early pages of the *Astronomical Herald*, where he announced the results of his own pioneering use of the new optical instrument. The new astronomical features contradicted the Aristotelian-Ptolemaic cosmology and promoted the heliocentric system, although they were not decisive arguments in favor of the Copernican theory. Those great novelties led Galilei to deem his own instrument a clear instance of God's sapiential work. 'All which facts were discovered and observed a few days ago by the help of a telescope devised by me, through God's grace first enlightening my mind.'[8]

In the *Copernican Letters*, written between 1613 and 1615, Galilei draws inspiration from the principle of accommodation to demonstrate the compatibility of the Heliocentric hypothesis and those biblical passages literally describing the immobility of the Earth and the motion of the Sun. According to Galilei, the Bible is not a scientific book, and that presupposition implies that mathematical demonstrations should be the only source for natural knowledge. The study of the mathematical beauty of nature is grounded in God's will, and that

6 *ibid*., p. 464

7 *ibid*., p. 335

8 Galilei, G. *The Astronomical Herald*. Oklahoma City: Byzantium Press (2004), p. 5.

belief results in the absolute reliability of demonstrations based on the universality of mathematical language. Teaching common people the real structure of the universe is not the intention of the sacred authors, as only mathematical demonstrations allow human beings to comprehend that aspect of the beauty of the world. So, as regards to astronomical issues, biblical scribes cannot 'have said so little about them – almost nothing compared to the infinite, profound, and wonderful truths which are demonstrated in this science.'[9]

As the Scriptures are written for ordinary people, we should not start discussing physical issues from the authority of biblical passages. Thus, only 'sense experiences and necessary demonstrations', founded upon mathematical reasoning, can disclose natural laws. Consequently, biblical authors had to accommodate their language to the understanding ability of common people. 'Nature, on the other hand, never transgresses the laws to which it is subject, but is inexorable and unchanging, quite indifferent to whether its hidden reasons and ways of working are accessible to human understanding or not [...] for not every statement of Scripture is bound to such strict rules as every effect of nature, and God is revealed just as excellently in the effects of nature as in the sacred sayings of Scripture.'[10]

The mathematical harmony of the universe is directly involved in the interaction between faith and science. Preventing scientists from revealing the exact mathematical laws of the world means cancelling the significance of many biblical verses that announce the outstanding beauty of God's creation. 'And to forbid the whole science of astronomy would be nothing less than contradicting a hundred passages of Holy Scripture, which teach us that the glory and greatness of God are wonderfully revealed in all his works, and made known divinely in the open book of the heavens.'[11]

Kepler's cosmology

Johannes Kepler deserves a special consideration among the most eminent thinkers of the Scientific Revolution, not only for having expressed the three laws of planetary movements. In his investigation he adopted a typical deductive method, in which the mathematical harmony of the planetary system was the basic presupposition upon which he found his astronomical research, that resulted in a very elegant and accurate model of the heavens. His meticulous search for real causes of heavenly motions trusted in the Biblical message as something that constitutes the premise of his achievements. In a letter written in 1598 to the Baron Herwart Von Hohenburg (1553-1622), Kepler declared

9 op. cit., Galilei 2012, p. 68.
10 *ibid*., p. 67
11 *ibid*., p. 77

that astronomers can be compared to priests, as their understanding of celestial laws leads to recognize the work of the Creator. 'Since we astronomers are priests of the highest God in regard to the book of nature, it benefits us to be thoughtful, not of the glory of our minds, but rather, above all else, of the glory of God.'[12]

Kepler's Platonism lies in the assumption that the universe is patterned upon geometrical forms, the only conceptual tools able to guarantee unity and beauty to nature. However, that vision does not prevent him from combining Platonic philosophy with Christian revelation. As humans created in the image of God, they share with the Divine Mind the mathematical archetypes upon which nature is structured. Similarly to what Galilei writes in the *Dialogue Concerning the Two Chief World Systems*, he defends his conception against the risk of drawing from it a false equivalence between God and man.

Those laws are within the grasp of the human mind; God wanted us to recognize them by creating us after his own image so that we could share in his own thoughts. For what is there in the human mind besides figures and magnitudes? It is only these which we can apprehend in the right way, and if piety allows us to say so, our understanding is in this respect of the same kind as the divine, at least as far as we are able to grasp something of it in our mortal life. Only fools fear that we make man godlike in doing so; for the divine counsels are impenetrable, but not his material creation.[13]

Kepler's heliocentric cosmos is a direct consequence of a realist view that cannot accept an astronomy aimed at merely saving appearances. God's love for humanity led to the formation of a universe, adapted to the human ability to understand it, disclosing the greatness of His supreme intelligence behind the mathematical regularity of the heavenly realm. The following words recall the meaning of the above mentioned *Wisdom* 11:20. Thus, if the Creator arranged everything according to number, measure, and weight, man's ability to understand the world must reflect a mathematical character or, to put it more simply, science is founded upon mathematics. 'We see how God, like a human architect, approached the founding of the world according to order and rule and measured everything in such a manner, that one might think not art took nature for an example but God Himself, in the course of his creation took the art of man as an example, though man was to appear only later on.'[14]

The book of the heavens must be interpreted as a rational entity that is geometrically shaped. Heavens and Scriptures are written in different languages, but the presence of God in nature can be grasped thanks to its mathematical

12 Kepler, G. *Gesammelte Werke*, Munich: C.H. Beck (1938), XIII, p. 193.

13 Frankenberry, N. *The Faith of Scientists in Their Own Words*, Princeton and Oxford: Princeton University Press (2008), p. 45.

14 op. cit., Kepler 1938, I, p. 6

proportionality, that offers human beings the chance to contemplate it. 'Here is treated the Book of Nature which is so highly praised by the Holy Scriptures [...] Why should we Christians take less pleasure in contemplating since it is our task to honor God in the right way, to worship and admire Him? Our worship is all the more deep, the more clearly we recognize the creation and its greatness.'[15]

In Kepler's view, the structure and working of the universe cannot be distinguished from questions regarding its origin. Creation bears the stamp of the divine mathematical mind; geometry shapes the physical structure of the universe and becomes the basis for creaturely praise. Kepler draws from Aristotelianism the form-matter dualist approach, though his own hylomorphic account of reality is based on a reductionism, according to which the unchanging quantity stands for the natural substantiality, as numbers are the main pattern in the mind of God. 'It was matter which God created in the beginning; and if we know the definition of matter, I think it will be fairly clear why God created matter and not any other thing in the beginning. I say that what God intended was quantity. To achieve it he needed everything which pertains to the essence of matter; and quantity is a form of matter, in virtue of its being matter, and the source of its definition. Now God decided that quantity should exist before all other things.'[16]

The extraordinary beauty of Kepler's world is grounded on his own realism and an objective natural knowledge can only result in the contemplation of its mathematical proportions. Kepler sees science as a divine pursuit and a mystical union with the divine mind, and that is why universal mathematical beauty forms part of God's announcement to humanity. 'Why indeed? Unless because by a most perfect Creator it was absolutely necessary that a most beautiful work should be produced [...] This pattern, this Idea, he wished to imprint on the universe, so that it should become as good and as fine as possible; and so that it might become capable of accepting this Idea, he created quantity.'[17]

Although the German astronomer, as other scientists used to do, developed his hypotheses in accordance to the need to compare observations with predictions, mathematical symmetry as a real quality of the world is the standpoint of his investigation. Against any sort of subjectivism, his realist approach is strengthened by the idea that beauty proves the divine origin of mathematical astronomy. Within that perspective, analogous to revelation, geometry is unique and the proportionality of matter shows the divine love for humanity. 'Geometry is unique and eternal, and it shines in the mind of God. The share of it which has been granted to man is one of the reasons why he is the image of

15 op. cit., Frankenberry, p. 43

16 *ibid*., p. 39.

17 *ibid*., pp. 40-41.

God. Now in geometry the most perfect class of figures, after the sphere, consists of the five Euclidean solids. They constitute the very pattern and model according to which this planetary world of ours was apportioned.'[18]

Kepler provides his planetary system with a broader metaphysical foundation, as he incorporates God's quantitative ideas into the substantial order of matter. He appeals to the concept of the divine design to establish the existence of a God-man providential relationship. Providence as a primary cause of the universe implies that man, being an intelligent creature, must contemplate the work of the Supreme Wisdom. Kepler's preoccupation with questions such as goal and meaning prompts him to believe in a world infused with full intelligibility for the benefit of his privileged creature. God's governing providence is displayed in mathematical regularity as an evident instance of the divine manifestation to man. In sum, creation is made for worship, and astronomy is a divine discipline helping to encourage religious belief.

It was his wish to invite men to consider the benefits accruing to them from each of these works of the six days. I, too, implore my reader, when he departs from the temple and enters astronomical studies, not to forget the divine goodness conferred upon men, to the consideration of which the psalmodist chiefly invites. I hope that, with me, he will praise and celebrate the Creator's wisdom and greatness, which I unfold for him in the more perspicacious explanation of the world's form, the investigation of causes, and the detection of errors of vision. Let him not only extol the Creator's divine beneficence in His concern for the well being of all living things, expressed in the firmness and stability of the earth, but also acknowledge His wisdom expressed in its motion, at once so well hidden and so admirable.[19]

Mathematics is coeternal with the divine mind, and celestial dynamics is understood as the best opportunity to join mathematical cosmology with theology. In the following words, forming part of *The Harmony of the World*, the idea of mathematics having a divine origin is openly stated.

For geometry, [...] is coeternal with God, and by shining forth in the divine mind supplied patterns to God, as was said in the preamble to this Book, for the furnishing of the world, so that it should become best and most beautiful and above all most like to the Creator. Indeed all spirits, souls, and minds are images of God the Creator if they have been put in command each of their own bodies, to govern, move, increase, preserve, and also particularly to propagate them.[20]

The direct consequence of Kepler's pioneering work is that natural science

18 *ibid*., p. 55.

19 Kepler J. *New Astronomy*. Cambridge: Cambridge University Press (1992), p. 65

20 op. cit., Frankenberry, p. 56

is directed towards a transcendent goal. God grants man specific skills to appreciate the natural order, and that ability allows a unitary understanding of creation. So human beings must praise God for the possibility to achieve that natural harmony, by allowing their participation in the divine perfection. 'I thank Thee, Creator Lord, because Thou hast made me delight in Thy handiwork, and I have exulted in the works of Thy hands. So, I have now brought to completion the work of my covenant, using all the power of the talents which Thou hast given me. I have made manifest the glory of Thy works to men who will read these demonstrations, as much as the deficiency of my mind has been able to grasp of its infinity.'[21] The final words of the *The Harmony of the World* can be considered a sort of synthesis of Kepler's cosmology. 'Praise him, sun and moon; give praise, all shining stars. Praise him, highest heavens, you waters above the heavens' (Ps 148:3-4). That is the Psalm inspiring his cosmological reflection, that serves as his theological aim. The harmony and beauty of the heavens witness the Creator's majesty and excellence. 'The heavens declare the glory of God' (Ps 19:2), therefore admiration of their supreme beauty bids the celestial realm itself to celebrate the divine Wisdom in a universal acclamation of her sovereignty. 'Great is our Lord, and great is His excellence and there is no count of His wisdom. Praise Him heavens; praise Him, Sun, Moon, and Planets, with whatever sense you use to perceive, whatever tongue to speak of your Creator; praise Him, heavenly harmonies, praise him, judges of the harmonies which have been disclosed; and you also, my soul, praise the Lord your Creator as long as I shall live.'[22]

In another meaningful text, Kepler is clearly inspired by the following words from the New Testament: 'for in him were created all things in heaven and on earth, the visible and the invisible […] all things were created through him and for him.' (Col 1:16-17) The ordering work of a purposeful creation is connected to the role of man within the supreme design. The constant presence of Wisdom alongside the world's construction leads Kepler to emphasize the goodness of God's handiwork, whose contingent character owns an intrinsic value. If the celestial order is established to be revealed, then man is called to recognize God's purposive action and praise its religious finality. 'For from Him and through Him and in Him are all things, "both sensible and intellectual," both those of which we are entirely ignorant and those which we know, a very small part of them, as there is yet more beyond. To Him be praise, honour, and glory from age to age. Amen.'[23]

21 Kepler, J. *The Harmony of the World*. Philadelphia: American Philosophical Society (1997), p. 491.

22 *ibid*., p. 498.

23 *ibid*., p. 498.

Conclusions

The emergence of exact science in the modern age can be connected to the basic principles of the Christian faith. More in detail, modern science originated in the Scientific Revolution, whose main protagonists believed in the Creator as the origin of the universal harmony. Establishing an incompatibility between Christianity and science would be nonsensical for an objective reconstruction of the historical development of the scientific discourse. Galilei's and Kepler's conceptions on the mathematical universe as a divine gift provide further evidence to that consideration.

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RAVI SCOTT JAIN

Editorial: Articles in Honour of Alister McGrath

For many in science and religion Alister McGrath is a familiar, even legendary, name. While finishing a doctorate in molecular biophysics at Oxford University he also started a bachelor's degree in theology. When Oxford University Press invited him to pen a Christian response to Richard Dawkins' *Selfish Gene* soon after it came out in 1976, he decided to wait until after he had obtained a doctorate in theology at Cambridge - or longer. In fact, he did not finally return to write *Dawkins' God* until 2004, after he had become one of Britian's pre-eminent theologians. For, in 2001 Oxford University had regaled him with the venerable Doctor of Divinity degree for his work in historical and systematic theology. While we honour him now in science and religion, McGrath has reached the apex of his field of theology in three different subdisciplines: science and religion, historical theology, and systematic theology. These feats, along with his incredible output (more than 60 books and countless articles), are what give McGrath the well-deserved reputation as a polymath of polymaths.

But of course, he is only human. And this set of articles, each delivered in honour of McGrath at the 2022 annual conference at Oxford's Ian Ramsey Centre for Science and Religion, seeks to illuminate not only his scholarly impact but also his human side. For that purpose, the first and most valuable article is written by his wife of 43 years, Joanna Collicutt McGrath. In "Why Write Theology Books? A Reflection on Authorial Collaboration with Alister McGrath," she offers not only insight into his career as a scholar but a rare glimpse into his motivations as a person. Though some had warned him against it, Alister did not scorn writing popular books for Christian lay audiences. Instead, he saw it as part of his calling to be useful, to serve others, and to create beauty. She also discusses the process of collaborating with Alister on four books which contextualize how the partnership between science and religion can be of particular benefit. For one project, as a clinical psychologist she contributed the scientific perspective on positive self-esteem while he provided the theological perspective on justification. Joanna Collicutt McGrath's piece is not only heartening but an honest reflection on the pitfalls and triumphs that academics face today and how to navigate them with grace.

Stephen Goundrey-Smith recounts how Alister McGrath advised him to research conditional immortality when he was a student at Wycliffe Hall. Not only did this advice lead him to further research then, but that topic informs his article in this collection, "Conditional to What? Achieving Immortality in a Technological World." Goundrey-Smith compares the technological immortality offered by transhumanism to the immortality offered in the Christian doc-

trine of the resurrection. In particular, is technologically preserved indefinite life without freedom from sin really worth possessing? Or is it closer to a hell of man's own making? In a line reminiscent of *The Abolition of Man* or *Brave New World* Goundrey-Smith notes that while it may seem appealing that "technocentric immortality is under human control, in reality it may not be under *our* human control."

The title for Mike Parsons' "Never in the Shallow End" comes from "the humorous observation that in swimming pools all the noise comes from the shallow end." As a former executive director for the Ian Ramsey Centre Parsons has a unique perspective on these discussions. He notes that McGrath has never been in the shallow end. Parsons particularly examines McGrath's focus on inference to the best explanation in both science and religion and how it relates to Mary Midgley's "multiple maps of meaning." Parsons contends that, "the problem is not so much in the academy…but in the schools, churches and religious communities," and he encourages these communities towards "deep end exploration" regarding science and religion.

Ravi Scott Jain continues the theme of inference to the best explanation by arguing that McGrath advances "Science and Theology as Abductive Responses to Reality." Jain explores McGrath's appropriation of Roy Bhaskar's principle that "ontology determines epistemology" and McGrath's notion that both "science and religion are responses to reality." He then contends that the special kind of response that McGrath emphasizes in science and religion is abductive. Jain further argues that if properly situated next to the method of hypotheses, far from being an innovation, abduction can be seen as a traditional strategy for argumentation in theology.

Humberto Schubert Coelho's "The Place of a Scientific Theology among Theological Disciplines" situates McGrath's scientific theology project in relation to natural theology and systematic theology. Coelho argues that while natural theology as conceived by Thomas Aquinas saw no conflict between reason and revelation, the natural theology advocated by the Enlightenment thinkers like Baruch Spinoza did. Thus, a rupture occurred between natural theology and dogmatic or systematic theology. Coelho contends that McGrath's scientific theology is perfectly situated to bridge that gap. He concludes that, "McGrath is in fact creating a new discipline, which is based on a fallibilist and progressive account of the reality of God, according to the actual knowledge the natural world can provide about God."

And finally, in "Revisioning 'Wissenschaft': Mining Alister McGrath's development of 'Pictures' and 'Imagination' for the General Philosophy of Science" Michael Borowski argues that the role of imagination has increased in McGrath's thought over the past two decades. By examining some of McGrath's major works, he considers how the theme of imagination becomes more prominent in his later works. He pays special attention to McGrath's use of phrases like

"big picture", "imaginarium", and "disciplinary imaginary."

Together these articles display the breadth and depth of the impact that McGrath's work has had on scholars spanning multiple continents and multiple subdisciplines. But they also portray his human side as a convener, a guide, a sparring partner, a husband, and a faithful servant of Christ. Thank you to *Science & Christian Belief* for hosting this collection of articles to honour him and to the Ian Ramsey Centre for hosting this conference. Additional thanks belong to the conference director Andrew Pinsent and to the associate guest editors for this collection: Stephen Goundrey-Smith, Humberto Coelho, and Jacob Chengwei Feng. The science and religion community has benefitted enormously from McGrath's work over the past four decades. As he retires as the Andreas Idreos Professor of Science and Religion at Oxford University, may he find every success in his next endeavours.

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JOANNA COLLICUTT MCGRATH

Why Write Theology Books? A Reflection on Authorial Collaboration with Alister McGrath

This article is a personal reflection on the process of collaboration between the author and Alister McGrath on a number of writing projects in the area of science and religion and natural theology. It sets out a biographical context, describes some of the projects in detail, and explores the motives and principles behind McGrath's writing. It concludes that these principles should be intentionally employed by those who write for publication in these areas.

Keywords: Alister McGrath, self-esteem, writing, biography

If you want a golden rule that will fit everybody, this is it: Have nothing in your houses that you do not know to be useful, or believe to be beautiful.[1]

This article is a reflection on the experience of writing books with Alister McGrath. It begins with some contextual biographical and autobiographical material; continues with a brief consideration of the five books we have worked on together; and concludes with an exploration of McGrath's motivation for writing and some of his values as a writer, researcher, and most importantly, teacher. These are well illustrated by the quotation above from William Morris; for McGrath writing is a craft whose main purpose is practical usefulness, and in recent years has increasingly been marked by theological wonder at the beauty revealed by scientific research.

Biographical context

I met Alister McGrath at Oxford University when I was nineteen and he was twenty. I was a freshman studying for a degree in experimental psychology and he was in the third year of a four-year degree course in Chemistry. Both of us were active members of our college Christian Unions; I had been a Christian for nearly six years, he was a fairly recent convert.

At that time Oxford took very few female students and they were confined to 'ladies' colleges'. This was about to change; some of the men's colleges, including McGrath's college of Wadham, were about to admit a small number of women on an experimental basis. This caused some anxiety on the part of the

1 Morris, W. *The Beauty of Life*, a lecture before the Birmingham Society of Arts and School of Design (19 February 1880).

College Christian Union; they thought it possible that their usual practice of welcoming and befriending freshmen might be mistaken for what would now be called sexual harassment. So, they decided to consult the Christian Union at the nearest ladies' college. This was Lady Margaret Hall, my own college. This is how we found ourselves in the same room, making awkward conversation on a late autumn evening in 1973.

McGrath asked me what I was studying and what I hoped to do afterwards. I told him that I hoped to be ordained as a priest in the Church of England, but that this was a long-term aspiration as, in addition to being excluded from most Oxford colleges, women were also excluded from the orders of priest and deacon in the Church of England at that time. In response, he told me that he hoped to be a career scientist.

I was interested to hear this, and took the opportunity of asking him a question that had been perplexing me for the last few years: 'Is the uncertainty in Heisenberg's uncertainty principle located in the phenomenon or in the observer?' I had asked this question of other physicists and chemists of my acquaintance and it usually evoked a look of boredom and a fairly rapid change of subject. But McGrath was different; he did not answer the question, but neither did he dismiss it. 'Now that's very interesting…', he began. Two Christians were starting to form a friendship whose currency was philosophy of science.

After I finished my degree, I moved away to London to train as a clinical psychologist and we lost touch for a time. When we reconnected, things had changed. McGrath was finishing off his doctorate, having made a move into molecular biology via biochemistry while studying for a BA in theology in preparation for training as a priest in the Church of England at Westcott House in Cambridge. I, meanwhile, had set my thoughts on ordination to one side, and had become a career scientist working on psychophysical models of auditory hallucinations. The tables had turned entirely.

The circumstance of our meeting again was a road trip around Ireland with some friends. He and I spent much of this trip arguing about theories of the origin of the universe and their theological implications. The way the relationship developed is well summed up by CS Lewis:

Aravis also had many quarrels (and, I'm afraid even fights) with Cor, but they always made it up again: so that years later, when they were grown up, they were so used to quarrelling and making it up again that they got married so as to go on doing it more conveniently.[2]

After our marriage in 1980 McGrath was ordained and began work as a curate in Nottingham. We quickly had two children, and it was at this very busy

2 Lewis, C.S. *The Horse and his Boy*, London: Geoffrey Bles (1954) p.199.

and intense time that he began work on his first book, *Iustitia Dei*, a history of the Christian doctrine of justification based on research he had carried out in his Cambridge years, during which time he had developed an intense interest in the thought of Martin Luther. It was a big piece of work and progressed relatively slowly by McGrath's later standards, mainly due to difficulties with the publication process. By the time it was published he had taken up a post as lecturer in doctrine and ethics at Wycliffe Hall in Oxford.

My first contribution to McGrath's writing was to suggest that he choose a local publisher with a broad rather than specialist academic appeal, and we decided to approach Blackwell. This proved to be an excellent idea, and the beginning of a lifelong association. Blackwell published McGrath's first book *Luther's theology of the cross* in 1985, a year before *Iustitia Dei* finally appeared.

As the 1980s progressed, there followed a steady stream of books. McGrath was gaining a great deal of experience in teaching, each year refining his approach in order to be responsive to the learning needs of his students. It was in this context that he decided to write a Christian theology textbook, which is discussed further in the final section of this paper.

Collaborating on books

McGrath had begun to write books for the popular Christian market. The first of these, and perhaps his best, was *Understanding Jesus*, published by Kingsway Press in 1987. The commissioning editor knew that I was a psychologist and approached us about the possibility of working jointly on a book that brought the Christian faith and psychology together. I was working in the area of neuropsychological rehabilitation with young adult survivors of severe traumatic brain injury and related conditions. At that time cognitive behavioural therapy (CBT) was being developed by a group of Oxford psychologists with whom I had quite close contact.[3] It was becoming very influential, and I had been exploring ways of adapting it to my own clinical specialty.

My work seemed increasingly to be focusing on self-esteem. This is because most of my patients were individuals who, due to injury or illness, had lost the things that people usually rely on to feel that they are worth something: attractive appearance, being able to walk or speak, cognitive capacities, employment in a high status profession, friendships and romantic relationships. CBT approaches specifically directed at low self-esteem were beginning to emerge,[4]

3 Hawton, K, Salkovskis, P.M., Kirk, J.& Clark, D.M. (Eds.) *Cognitive Behavioural Therapy for Psychiatric Problems: A Practical Guide,* Oxford: Oxford University Press (1989).

4 Fennell, M.J.V. *Overcoming Low Self-Esteem : A Self-Help Guide Using Cognitive Behavioural Techniques.*
London: Constable & Robinson (1999).

but I was troubled because these (and CBT more generally) seemed to be based on trying to build confidence and a sense of self-worth on perceived successes in life; improving self-esteem was thus directed at supporting the individual in achieving goals and helping her positively re-appraise their significance by correcting negative biases in her thinking caused by conditions such as depression.

While this made intuitive sense in the clinical settings in which CBT was applied, it seemed at odds with the dominant discourse in church settings, in which human sin, the need for self-loss, and the importance of humility were all emphasized (to varying degrees depending on local church culture). I wondered if this apparent tension could be explored, and perhaps even reconciled in a book.

McGrath had often talked to me about his work on justification by faith (though I was much more familiar with Paul than with Luther), and I began to wonder if this theological concept would be of help in relation to self-esteem. In particular I wondered if there was such a thing as authentic positive self-esteem, and whether this might be the psychological counterpart of what E.P. Sanders refers to as being 'righteoused' by God,[5] together with a more fragile inauthentic sense of self-esteem that was dependent on external sources of reward corresponding to Pauline 'works of the law' (e.g. Rom.3:27). Subsequently the distinction between a self-esteem based on unconditional love and one based on external reward has proved a fertile area of exploration for psychology.[6]

I also began to link some of this thinking to attachment theory,[7] looking at faith as the ability to apprehend God as a reliable parent figure who offers a 'secure base' and a 'safe haven'. The book, *Self-esteem: The Cross and Christian Confidence*, came out in 1992, the same year the psychologist of religion Lee Kirkpatrick published his seminal article on the theory of God as an exalted and non-corporeal attachment figure,[8] but at that stage psychology of religion was not my discipline, so I remained unaware of his work.

I wrote most of the book, but McGrath provided the pivotal chapter on theories of justification together with a chapter on criticism for the second edition. Perhaps most importantly, he provided strong editorial direction, repeatedly reminding me of the audience at whom it was aimed. Until he drew my attention to this issue, I had simply not considered it; I had seen the book as a way of

5 Sanders, E.P. *Paul: A Very Short Introduction*, Oxford: Oxford University Press (2001).

6 Crocker, J. & Park, L. 'The costly pursuit of self-esteem', *Psychological Bulletin* (2004) 130, pp392-414.

7 Bowlby, J. *Attachment and loss,* London: Hogarth Press (Three volumes 1969, 1973, 1980).

8 Kirkpatrick, L. 'An Attachment-theory Approach to the Psychology of Religion', *The International Journal for the Psychology of Religion* (1992) 2, 3-28.

clarifying my own ideas, with any benefit to the readers viewed as a happy but barely intentional side-effect.

While McGrath helped me with *Self-esteem*, I had some small reciprocal input into some of his later books. These were the second volume of his trilogy *A Scientific Theology* (2001), to which I contributed a short section on the stratification of reality, an area in which I have a longstanding interest;[9] and the biographical *Dawkins' God* (2004), to which I contributed some psychological reflections.

Finally, we worked collaboratively on two projects: *The Dawkins Delusion?* (2007) and *The Open Secret: A New Vision for Natural Theology* (2008). They ran in tandem, with the *Open Secret* a planned leisurely exploration of natural theology and *The Dawkins Delusion?* produced as a rapid response to the publication of the polemical *The God Delusion*.[10] In both these books we brought psychology, neuroscience, and theology together, something that I was by then able to engage with in a more informed way, having taken a career break to study academic theology in Oxford a few years earlier.

My reflections on the process of collaboration are that it was relatively easy when targeting a common intellectual opponent, as in the case of the *Dawkins Delusion?*, but much more challenging when attempting to do theology together, as in the case of the books on self-esteem and natural theology. I am still at heart a scientist, and I think McGrath finds my relentless demand for empirical evidence and theoretical rigour wearing; I in my turn find theology a subject area whose rules of engagement remain opaque to me. This is one reason I appreciate McGrath's *Scientific Theology* trilogy, with its aspiration to establish greater methodological clarity in theology. One issue on which we both often reflect is the interest that career scientists have in theological ideas as contrasted with the fear, disdain, or simple lack of curiosity with which many theologians approach science, its philosophical underpinnings, and its methodology, keeping it at bay with terms such as 'reductionist', 'positivist', 'simplistic', or 'mystery'.

Why write books at all?

The motivation behind McGrath's books is best illustrated by his most well-known publication, *Christian Theology: An Introduction* that first appeared in 1992 and has gone through several subsequent editions. It has always been appreciated by reviewers and students alike, but I came to a deeper personal understanding of its impact when undergoing residential training for ordained ministry in the Church of England in 2005, some 30 years after my first sense

9 Collicutt McGrath, J. *Jesus and the Gospel Women*, London: SPCK (2009), pp. 90-98.

10 Dawkins, R. *The God Delusion*, London: Bantam Press (2006).

of calling.

Late one night I heard a cry of despair coming from the room of a fellow-student. She ran out into the corridor and shouted, 'Help! I need Alister McGrath!' On seeing my quizzical expression she explained. 'I am stuck with my doctrine essay'. Later she told me that she thought McGrath's textbook was the theological equivalent to another book that was popular in the 1990s, Delia Smith's *Complete Cookery Course*. The student explained to me, 'You can always rely on Delia, especially in a crisis – she's clear, unpretentious, reassuring to those with little knowledge or skill, and guaranteed to give excellent results. Alister McGrath is the Delia Smith of theology.'

This is a surprisingly apt comparison, and it extends to the motivation behind the books. They were responses not to a gap in the market but to the real human need to learn of that which is life-giving. All through the 1980s and into the early 1990s McGrath had been teaching courses on Church History and Christian doctrine and becoming increasingly frustrated by the absence of high quality but at the same time accessible resources for his students. In the end he decided that the only solution was to write something himself, pitched it to Blackwell, and then produced something that opened up the life of the Christian mind and the historic tradition free from the mustiness, pretentiousness, opacity, and elitist language that so often taints theological writing.

One might think that it was his scientific training that lay behind this achievement, and there is something in that, but more fundamentally it was a passion to communicate something of the intellectual depths and delights of the Christian faith that had played such a big part in his own conversion, combined with an Irish pragmatism, and the sort of humility that does not care about snobbish accusations of dumbing down or loss of sophistication or nuance. This is William Morris' principle of producing something that should actually be useful, both to God and to other human beings, and that also expresses in a small way the justice, truth, and beauty of the Gospel. The book is an authentic outworking of the craft of teaching.

The key point here is that people read this book and they often go on to read other books by McGrath. This is not a trivial observation because the whole enterprise of writing in order to be read is arguably dying in contemporary academic culture. Many contemporary books are destined to end up on what has been referred to as the 'alumnae shelf'.

The 2017 film *The Wife* includes a telling scene set in a ladies' college in the USA in 1958, in which a famous visiting novelist has a conversation with a young aspiring writer, who begins, 'I love to write – it's my life.' The novelist replies, 'Don't do it. You want to know where your books will end up? Right there – on the alumnae shelf.' She reaches behind her and takes down a book, inviting the younger woman to open it. There is a creaking sound, and she continues, 'That's the sound of a book that's never been opened…' The younger

woman objects, 'A writer has to write.' The novelist retorts, 'A writer has to be read, honey.'[11]

Yet, much of what gets written in academia is barely read or not read at all. The reasons for this are complex but can broadly be categorized under the headings of perfectionism; instrumentalism; and citation. In my experience as a theological educator students often delay the writing phase of essays and dissertations, procrastinating by reading more and more material so that they can lose their way in it. This can sometimes be an expression of reluctance to express their ideas in written form for fear that they will be inadequate. It is a form of perfectionism with fear of exposure at its heart. Where this perfectionism is surmounted and an acceptable piece of work produced there can then be a similar reluctance to publish in book or article form. There is a continuing fear of being judged, this time by readers and critics rather than supervisors or examiners. The connection with the issue of self-esteem discussed earlier in this article is evident. Rarely does the idea figure that the piece of writing, though not perfect, might be useful to people, that this might even be its primary purpose (rather than to enhance or detract from the public profile of the writer).

Instrumental publication is also increasingly common. A young academic needs publications in high impact journals or with reputable publishing houses in order to enter and maintain a place in their particular academic guild and to achieve the glittering prize of an academic post. In the humanities doctoral theses are published in the form of prohibitively expensive specialist monographs which remain largely unread in library stacks. Higher education institutions are judged on the basis of their research outputs which are essentially pieces of writing. Grant-giving bodies often require conferences to be held and the proceedings written up, typically as a special issue of a journal or a multi-author book. The process of managing multiple authors can be unwieldy with the result that the contents can be out of date by the time they are published.

Thirdly, with the ease of accessing publications electronically there appears to be an increasing tendency to cite works without actually reading them, as a form of defensive ritual to insure against criticism of potentially weak points in an argument.[12]

There is no simple answer to this problem. Nevertheless, some wisdom may be gleaned from returning to the principles behind McGrath's writing, whose origins are now a generation ago. First, engage with questions that people are actually asking rather than the ones you think they should be asking. Second, communicate clearly, something that is itself a mark of mastery of a field. Third,

11 Screenplay by Jane Anderson. *The Wife*, Sony Picture Classics (2017).

12 Simkin, M.V. & Roychowdhury, V.P. ' Read before you cite!', *Complex Systems* (2003)14, 269.

be content with work that is - to use a term of the psychoanalyst Donald Winnicott – 'good enough'. This will ensure that the product is timely, if not perfect. Finally, reflect theologically on the concept of 'intellectual property' Writing is a participating in God's ideas, and the tendency of the writer to grasp them as his or her own creations should be subjected to critical scrutiny. Publishing is not an exercise in building up the writer's ego but in sharing God's bounty. Taking this perspective has the effect of lightening the enterprise and liberating the writer.

Conclusion

This is the philosophy that McGrath has lived out over a long career of serving his God in the academy and the church, always striving to integrate insights from theology and the sciences into an account that does justice to the richness of the Christian gospel.

We write, not just to bear witness to what we have seen, or because we have something to say; but to address a question, meet a need, or feed a hunger, as he did for me as an Oxford freshman 50 years ago.

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STEPHEN GOUNDREY-SMITH

Conditional to What? Achieving Immortality in a Technological World

Humanity has long sought immortality - but now, with the prospect of life-extending medical enhancement technologies, immortality is closer than it ever has been previously. Or is it? And at what price? This paper brings together two important strands of Alister McGrath's teaching and research – the history of systematic theology, and the science-religion dialogue. In this paper, I discuss the Christian doctrine of conditional immortality in relation to the prospects of technocentric immortality achieved through proposed radical transhumanist technologies. Drawing on the work of Brent Waters and Juraj Odorjak, I highlight the points of divergence between technocentric immortality and a recognisably Christian eschatology and, in relation to conditional immortality, I explain why the achievement of technocentric immortality is both theologically problematic and a futile objective in relation to the spiritual health of the Christian believer. I conclude by describing the implications of the doctrine of conditional immortality for the prospect of human enhancement, and vice versa, thus providing a preliminary worked example of the interaction of science and theology envisaged by Professor McGrath in A Scientific Theology.

Keywords: Immortality, transhumanism, eschatology, conditional immortality, theocentric immortality, technocentric immortality, hell.

Introduction

Human beings have sought to acquire immortality since time immemorial.[1] The pseudo-science of alchemy, practiced from the thirteenth century onwards, with the emblematic 'elixir of life', was concerned with the notion of human mortal transformation,[2] and, over the centuries, immortality has been a preoccupation of many world religions – from the Christian doctrine of the resurrection,[3] to the Buddhist idea of reincarnation.[4] In recent years, however,

1 Bostrom, N. 'A history of transhumanist thought' *Journal of Evolution and Technology* (2005) 14, 1-25 (p. 1)

2 More, M. 'The philosophy of transhumanism', In More, M. Vita More N. (Eds) *The Transhumanist Reader: Classical and Contemporary Essays on the Science, Technology and Philosophy of the Post-Human Future*, Chichester: Wiley Blackwell (2013), pp. 1-17 (p. 9).

3 See Farrow, D. 'Resurrection and immortality' In Webster, J., Tanner, K., Torrance, I. (Eds) *The Oxford Handbook of Systematic Theology*, Oxford: Oxford University Press (2007), pp. 212-235. Farrow compares the immortality demonstrated by the resurrection of Christ to the Platonic notion of the immortal soul, which was commonplace in the Greek world.

4 Ahamad, S., Madan, P., and Singh, A.K. 'Transhumanism in India: past, present and future' In

interest has grown in the prospect of life-extending biomedical technology - whether through physicochemical interventions, cryogenic body preservation or cybernetic reconstruction - because of the work of the transhumanist movement, which seeks to change human life and experience through medical technology. However, there have been ethical concerns about the socioeconomic impact of the widespread use of life-extending biomedical technologies in human society – for example, on welfare, employment, marriage and relationships.[5] In this paper, I describe a Christian understanding of immortality, the doctrine of conditional immortality, and compare it with recent ideas of technocentric immortality, proposed by the transhumanism movement.

However, I'd like to begin with a personal anecdote about how the idea for this work came about. As a student at Wycliffe Hall, Oxford, in 1998, I went to see Alister McGrath, who was the principal there at the time, to discuss a topic for an assessed essay in Christian doctrine. I had wanted to do the essay on eschatology – but Alister clearly thought that this was a brave – if not reckless – idea on the part of a rookie theology undergraduate, and suggested I focus specifically on the idea of conditional immortality instead! At that point, I had not heard of conditional immortality – but that's what I did my essay on. Thus began my interest in theological anthropology, which in turn led to my doctoral work on the ethics of transhumanism and, in a roundabout way, to this paper. I am very grateful to Alister, therefore, for his inspiration for much of the theological research I have done to date.

This paper, therefore, concerns the small matter of immortality, a significant human concern over the centuries. First, I will describe the doctrine of conditional immortality – the idea that our potential for immortality is actualised by God through Christian faith – and explain why conditional immortality arose as a more appealing alternative to the traditional doctrine of hell as the fate of the unbeliever at death.

Second, I will describe how the immortality conferred by Christian belief differs from the immortality conferred by transhumanist biomedical technologies. Third, I will argue that the promises of the technological future are largely illusory, and that the quest for biomedical immortality is both theologically problematic and spiritually futile. Fourth, and finally, with reference to Alister McGrath's *A Scientific Theology*, I will describe how the doctrine of conditional immortality provides an important point of contact and reflection between theology and the technological world.

Although this paper is about the futuristic implications of biomedical tech-

Lee, N. (ed) *The Transhumanism Handbook*, Cham: Springer (2019), pp. 701-714.

5 Stock, G. & Callahan, D. 'Debates: point-counterpoint: would doubling the human life span be a net positive?' *Journals of Gerontology Series A: Biological Sciences and Medical Sciences* (2004) 59, B554–B559.

nologies, the roots of the issue in view here lie firmly in the past. The traditional Christian account of post-mortem human destiny is that of heaven and hell. Heaven is a place of eternal life, with God, for those who are 'in Christ', who are Christian believers, whereas hell is a place of eternal, conscious punishment, separated from God, for those who have rejected Christ and the Christian Gospel.

However, hell is hardly an attractive prospect for anyone who posits the existence of a loving God. Consequently, in the mid-nineteenth century, an age of social progress, socially-minded theologians such as F.D Maurice began to voice doubts about hell as eternal conscious punishment, and faced opposition from the church because of it.[6] And, at that time, non-conformist ministers, such as Henry Dobney and Edward White,[7] began to preach the idea of conditional immortality as an alternative way for Christians to think about human destiny, rather than the dualistic prospect of heaven or hell.

The doctrine of conditional immortality is based on the Bible teaching that humanity is not inherently immortal but that, for the Christian, God actualises the potential for immortality and eternal life. On this basis, the non-believer simply passes out of existence at death, rather being consigned to the eternal conscious torment of hell. The doctrine of conditional immortality is consistent with Biblical material such as Matthew 10:28 and Revelation 21:8. Furthermore, it aligns with an essentially monistic account of post-mortem human destiny, such as that implied by the doctrine of the resurrection body in 1 Cor 15, as opposed to a dualistic cosmology of heaven and hell, which scholars such as Oscar Cullmann have claimed is due to the influence of Platonist thought, rather than a reflection of Christian eschatology.[8] For these two reasons, conditional immortality is a credible Christian doctrine.

But what factors gave rise to the growing interest in the doctrine of conditional immortality – and a corresponding decline in belief in the traditional doctrine of hell – during the nineteenth century? [9] There were three - a spiritual factor, a scientific factor and a social factor.

First, the spiritual factor was about the spirit of the age. Because of Enlightenment humanism, the climate of biblical scholarship in the nineteenth century was increasingly critical. There was therefore a general willingness

6 Travis, S. *Christian Hope and the Future of Man*, Leicester: Intervarsity Press (1980), pp. 16-17; Powys, D. 'The nineteenth and twentieth century debates about hell and universalism' In Norris F., de S Cameron, F., de S Cameron, N.M. (Eds) *Universalism and the Doctrine of Hell*, Grand Rapids, MI: Baker (1991), p. 93ff

7 Rowell, G. *Hell and the Victorians*, Oxford: Clarendon Press (1974), pp. 181-207.

8 Cullmann, O. *Immortality of the Soul or Resurrection of the Dead*, London: Epworth (1958), pp. 15-20.

9 Rowell, *op. cit.* (7), pp. 181-207.

to criticise Christian doctrines that had not previously been questioned. The sweeping response to this debate from the Edwardian scholar, Cyril Emmet was that 'modern critical Bible scholarship had made it quite clear that the traditional doctrine of hell wasn't in the Bible at all.'[10]

Second, the scientific factor related to Darwin's theory of evolution. Darwin's ideas questioned the assumption that human beings were in some way unique and that they alone of all animals possessed an immortal soul. Furthermore, with its materialist assumptions, Darwinian theory had undermined the body/soul dualism of a traditional Christian understanding of human nature,[11] and this influenced thinking about whether there was a soul and, if so, what it was, and what happened to it after death.

Third, there was a social factor. During the nineteenth century, there was considerable missionary activity, often in parallel with Britain's global trading routes – and it has become increasingly apparent that there were millions of people in the world who had lived and died without hearing the Christian Gospel. Was a loving, benevolent God really going to consign all these poor people to hell? In this context, the doctrine of conditional immortality was therefore a helpful compromise between universalism and the traditional doctrine of hell.[12]

During the twentieth century, the debate between hell and conditional immortality became a touchstone of orthodoxy among evangelical scholars – but this need not concern us here. Christians on both sides of the debate between conditional immortality and the traditional doctrine of hell would agree that those who die 'in Christ' gain immortality.

But the prospect of immortality comes in many forms. As mentioned previously, humanity has long sought immortality with alchemy and elixirs of life - but now, with modern medical technology, immortality is arguably closer than it has ever been before. Life expectancy has increased significantly recently; United Nations data show that, between the 1950s and 2022, world average life expectancy has increased by almost 30 years,[13] and mortality rates have correspondingly decreased since the late nineteenth century. These changes are partly due to the eradication of communicable diseases and partly because

10 Emmet, C. 'The bible and hell', In Streeter B.H. (ed) *Immortality: An Essay in Discovery*, London: McMillan (1917), pp. 202-209.

11 Pope, S. 'Theological anthropology: science and human flourishing', in Boeve, L., De Maeseneer, Y., Van Stichel, E. (Eds) *Questioning the Human: Toward a Theological Anthropology for the Twenty-first Century*, Oxford: Oxford University Press (2014), pp. 13-30.

12 Rowell, *op.cit.* (7), pp. 181-207.

13 United Nations. 'Department of Economic and Social Affairs, Population Division (2022). World population prospects: the 2022 revision', https://population.un.org/wpp/ (Accessed October 2022).

of the development of modern pharmaceutical medicine in the last fifty years.[14]

In the near future, genomic medicine and nano-particle technologies will have the potential to extend the human lifespan even further, and cryogenic body preservation may allow people to be preserved until cures become available for incurable diseases. And, in the more distant future, it may become possible to confer almost absolute immortality with radical cybernetic reconstruction, or even mind-uploading – uploading our consciousness onto a computer, so we can live on indefinitely without the encumbrance of a frail, biological body.

So, when faced with the approaching prospect of biomedical immortality, why should religious immortality still matter to us? Why should we accept the conditional immortality of religious belief, when we could strive for the absolute immortality conferred by biomedical technology? However, we should be wary of biomedical immortality because, as stated previously, there's immortality – and there's immortality. This is nothing new; the early church sought to distinguish the immortality of the resurrection body in Christian thought from the Platonic concept of the immortal soul.[15] It is therefore important for contemporary theologians to distinguish between theocentric and technocentric immortality. There are, of course, various reasons why Christian theologians might have concerns about radical biotechnology, but I'm going to concentrate here on the issues relating to eschatology.

Christian ethicist, Brent Waters rightly claims that transhumanist biomedical technologies confer a rather different eschatology on a person than the Christian eschatology of human finitude and Christ-ward destiny. Waters argues that the postmodern view of the world assumes a sharp dichotomy between an open and a deterministic view of the universe,[16] and, in response to technology, postmodern theology tends towards the open view. Waters contends that, while this downplays the notion of pre-destination, it also undermines human purpose and destiny. He argues that, if there is no eschatological *telos* for humanity, then there is no concept of divine providence, and therefore no purpose to the ordering of creation.[17] This is what Waters pithily describes as an "eviscerated eschatology".[18]

Waters therefore claims that theology is faced with a stark choice if it wishes to embrace the postmodern values that underpin the use of radical technolo-

14 Tranter, N. *British Population in the Twentieth Century*, Basingstoke: MacMillan (1996), pp. 71-82.

15 Farrow, *Op. cit.* (3), pp. 212-235.

16 Waters, B. *From Human to Posthuman: Christian Theology & Technology in a Postmodern World*, Aldershot: Ashgate (2006), pp. 123-125.

17 *ibid.*, p.123.

18 *ibid*., p.124.

gies: it must either discard eschatology altogether or redefine it in realised terms. If there is no robust eschatology, then every moral choice is a moment of judgment, where a person may be condemned because of their actions. Waters concludes that, in ethical terms, a postmodern, transhumanist approach to technology leads to slavery rather than freedom.

My slight quibble with Waters' argument is that he possibly conflates modernity and postmodernity as influences on technology adoption. The intellectual influences on the development of the doctrine of conditional immortality in the nineteenth century church were those of modernity, whereas the intellectual roots of transhumanism are arguably postmodern too.[19] But, in my view, his eschatological analysis is sound. There is theocentric immortality – immortality conferred on us by belief in an eternal God, whose Son, Jesus Christ, cheated death and rose to eternal life – and technocentric immortality – immortality that we might strive for by the adoption of biomedical technology. And there are two key differences between them.

First, unlike theocentric eschatology, technocentric eschatology is realised – it promises that immortality is ours for the taking the moment we apply the right biomedical technology. Second, unlike theocentric eschatology, technocentric eschatology is purposeless – it has no teleology. If we have adopted the technology now, and gained biomedical immortality now, what next?

In a more recent paper, the Slovakian philosopher, Juraj Odorcac, describes the quest for technocentric immortality.[20] He argues that, for the transhumanist, death is non-existence, which must be avoided at all costs, and that therefore transhumanists assume that immortality is a good thing. However, immortality clearly presents problems for humanity, and Odorcac reviews these. He cites Tod May's claim that immortality can lead to a loss of existential meaning in human life, Martha Nussbaum's contention that immortality undermines human value systems – and, of course, Bernard Williams' famous expression of the Makropulos Case – that immortality would be an experience so tedious as to be unbearable. I don't intend to describe these philosophical objections to immortality in detail here – but, in my view, these philosophical objections are consistent with other bioethical problems with immortality – for example, the social ethical concerns raised by Stock and Callaghan [21]- and they align with our lived human experience, given the increased life expectancy we already enjoy today and contemporary concerns with the feasibility and ethical evalu-

19 Pastor, L.M. & García Cuadrado, J.A., 'Modernity and postmodernity in the genesis of transhumanism-posthumanism', *Cuadernos de Bioética* (2014), 25(3), 335-350.

20 Odorjac, J. 'Scientific immortalism and the problematic future of technocentric immortality', *J. Stud. Religions and Ideologies* (2020) 19, 53-68.

21 Stock & Callahan, *Op. cit*. (5), pp. B554–B559.

ation of anti-ageing medical interventions.[22]

Here, Odorcac uses the term conditional immortality to describe a longer-lasting form of technocentric immortality; in other words, a person's immortality is conditional to the ongoing effectiveness of the biomedical technology they are using. However, if we consider the conditional immortality of Christian belief, and remember how the transhumanist hopes for absolute immortality, this situation is not at all satisfactory.

My argument is that, while there may be different forms of immortality, immortality is always conditional. There's always a catch. The key question is: conditional to what? Conditional to God's initiative in providing a Saviour, whose love for humanity is unconditional? Or conditional to the human initiative of biotechnology development?

Of course, technocentric immortality is tempting. It is tempting spiritually – people in the postmodern world still have a deep spiritual thirst and are still looking for transcendence, but not necessarily in doctrinal religion. It is tempting scientifically - because, with current scientific advances, technocentric immortality is increasingly scientifically plausible, even if not yet scientifically feasible. And it is tempting socially – because technocentric immortality appears to offer the prospect of the relief of human suffering, and the improvement of human wellbeing. Indeed, I believe that it's no coincidence that spiritual, scientific and social factors feature in the appeal of technocentric immortality in the twenty-first century, just as they did with the idea of theocentric immortality in the nineteenth.

But I contend that the promises of technocentric immortality are illusory. First, as argued earlier, the prospect of immortality, in the context of human society, is not ultimately a satisfying or rewarding prospect. Second, more often than not, biomedical technologies have unintended consequences. Perhaps the two best-known examples of these unintended consequences are the 1960s thalidomide disaster and the unexpected addictiveness of the benzodiazepines.[23]

Third, while it might be appealing that technocentric immortality is under human control, in reality it may not be under <u>our</u> human control. Depending on the circumstances, we might find that the technology for our immortal life is in the hands of corporations who want to exploit us, public policies that are

22 Petersen, A. & Seear, K. 'In search of immortality: the political economy of anti-aging medicine', *Medicine Studies* (2009) 1(3), 267-279; Turner, L. 'Biotechnology, bioethics and anti-aging interventions', *Trends in Biotechnology* (2004) 22(5), 219-221.

23 Quirke, V. 'Thalidomide, drug safety regulation, and the British pharmaceutical industry: the case of Imperial Chemical Industries', In *Ways of Regulating Drugs in the 19th and 20th Centuries*, London: Palgrave Macmillan (2013), 151-180; King, M. 'Is there still a role for benzodiazepines in general practice?' *British Journal of General Practice* (1992) 42: 202-205.

arbitrary and do not care for us, or our political and personal enemies who mean us harm.

Technocentric immortality is theologically problematic. It is a realised eschatology – one that we grasp now, rather than wait for God to fulfil at the right time. It is an eschatology that we want to control, rather than one where we surrender our very being to a sovereign God who understands all material things better than we do. Furthermore, it is an eschatology that takes us to a very different destination. Theocentric immortality is an eternity of perfection with the immortal Son of God in the spiritual realm. But technocentric immortality is an indefinite – and yet uncertain - life of our own making, where the pleasures of this world would inevitably pale and be rendered obscure, yet where the pains of this world would persist, and where our rightful union with God would be indefinitely delayed.

And, for these reasons, technocentric immortality is spiritually futile. It provides us with (to paraphrase St Paul) a false hope that is, in fact, no hope at all. It leads us away from God, and our God-given destiny, and on to a road to a self-defined nowhere. It is supremely individualistic and separates us from both God and our neighbour.

Indeed, I would dare to suggest that, while the nineteenth century advocates of conditional immortality objected to hell because it was eternal conscious torment - perhaps the real eternal conscious torment – the real hell – would be the eternity of imperfection in this world, which is the likely consequence of technocentric immortality.

What are the implications of the prospect of technocentric immortality for the lives and beliefs of Christians today? To explore this, I'd like return to my opening theme in this paper: conditional immortality as an innovation in Christian doctrine. In his important work, *A Scientific Theology*, Alister McGrath rightly argues that scientific theology is a system – a way of thinking – rather than an idea, or set of ideas.[24] In the light of science, theology should neither assert doctrinal principles in a dogmatic, inflexible manner, nor change its content to accommodate science - but reformulate its proposals in a nuanced way to reflect the unified reality of a world that may be understood theologically and scientifically. To develop a scientific theology, McGrath advocates the reaffirmation of three things, among others, in theology – the role of metaphysics in theology, the importance of the theological realm in a post-foundationalist context, and the importance of doctrine in the religious life.

I suggest that that the doctrine of conditional immortality is important for the church in a technological age and can be formulated in a scientific way. The idea that the potential for immortality is actualised by God for the Christian

24 McGrath, A.E. *The Science of God*, London: T and T Clark (2004), pp. 1-15.

believer provides an important layer of understanding of Christian soteriology in a technological world and helps us to make a head-to-head comparison of theocentric immortality and technocentric immortality, both metaphysically and morally. While further reflection on this will be the subject of future publications, as a preliminary argument I would contend that this approach demonstrates two things. First, the Christian doctrine of conditional immortality makes sense of the New Testament material – and it preserves the concepts of the judgement and the sovereignty of God in a world where we can impose human will on human nature with human technology. Second, the idea of eternal conscious torment, reappropriated as the experience of technocentric immortality, shows us that the concept of hell is still real and is still the alternative destiny for someone who resorts to technology for immortal life, rather than to an immortal God.

The human quest for immortality is ongoing. But, at this juncture of history, when immortality is closer than it has ever been before, we do well to remember that the technocentric immortality sought by the transhumanist movement is very different to the theological immortality envisioned by the historic Christian faith. In any case, all immortality is conditional. It's just a question of conditional…to what?

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MIKE PARSONS

Never in the Shallow End

The report, by Nick Spencer and Hannah Waite of Theos, 'Science and Religion: Moving away from the shallow end', was published in May 2022 It makes a number of interesting observations, based on both quantitative and qualitative research, as to how the debate about the relationship between science and religion has changed over the last fifteen years. The report title draws on the humorous observation that in swimming pools all the noise comes from the shallow end. The debate certainly has been 'noisy' at times and their report outlines areas where serious discussion has moved into deeper waters and with recognition of multiple ways of approaching formerly contentious issues.

Alister McGrath's work over many years illustrates this concern for discussion and not confrontation, along with a concern for an inference to the best explanation as the way forward. In particular his taking up of Mary Midgley's suggestion of 'multiple maps of meaning' has significant resonances with Spencer and Waite's outline of the 'areas of deeper concern', key areas in the science and religion debate, and the evidence from their expert interviews. This paper considers these areas in the light of the deeper, ultimate decisive questions that all human beings need to ask of themselves, as referred to by McGrath in his approving use of the work of José Ortega y Gasset. It observes that McGrath, throughout his writings and verbal presentation, never inhabited the shallow end of discussions. The paper then considers what insights these considerations might have in the Christian tradition for a more grounded missiology in the twenty first century.

Key words: McGrath, Theos, Midgley, Ortega y Gasset, missiology, Bosch, Polanyi, religion, science, world view.

In May 2022 *Theos* published their report *Science and Religion: moving away from the shallow end,* conducted by Nick Spencer and Hannah Waite[1]. The title was a play on the joke that discourses of conflict are like swimming pools: all the noise comes from the shallow end. The report was based on both quantitative and qualitative observations, a YouGov survey of over 5,000 UK adults and over 100 in depth interviews with scientists, philosophers, theologians and sociologists (from committed atheists to religious believers). The results were quite striking and will be referred to later.

1 Spencer N & Waite W, *Science and Religion: moving away from the shallow end*, London: Theos (2022)

Alister McGrath has never been a person to spend time in the shallow end of discourse yet still communicates lucidly and accessibly in his many publications. Lord (Richard) Harries of Pentregarth described *The Great Mystery* as 'a book that will challenge all dogmatists, whether scientific or religious, and which will greatly encourage those who are tentative and searching'[2]. Lord (Rowan) Williams of Oystermouth was equally enthusiastic about *Inventing the Universe,* 'a salutary shock to anyone who has taken for granted the received unwisdom on this subject'[3]. And the received unwisdom is extensive, facilitated in many cases by both popular and academic discourse failing to acknowledge what the philosopher Mary Midgley describes as 'Multiple Maps of Meaning'. McGrath is an admirer of Midgley's work and quotes her in several places, but particularly in *Inventing the Universe*.

Alister McGrath uses the terms 'a story to live by', or 'an interweaving of narratives' in his *Inventing the Universe*, rather than a single world view, where a world view may well include a number of interpretative narratives integrated into a coherent whole. The philosopher Mary Midgely's 'multiple maps of meaning', referred to several times by McGrath, adds to this necessary picture of a coherent matrix of stories by which we find meaning. These stories, for the theist, all find their origin in the Creator, however we may perceive such a deity.

World views are integrative frameworks, means of finding meaning in life, and interpretative frameworks, in which order and disorder are judged. A belief structure that is both irrefutable and unprovable: it is both descriptive (tells us how the world is) and also normative (how the world ought to be). They need not eliminate doubt but contain it within a greater overarching structure. The missiological challenge is not so much confronting the world view of the committed scientific secularist (such as Richard Dawkins) but that of the 'ordinary' person in society who does not realise that there are other ways of interpreting the world that are just as respectful of scientific enquiry, perhaps even more so, in which the Christian faith offers a credible alternative.

James Sire defines a world view as 'a commitment, a fundamental orientation of the heart, that can be expressed as a story, or in a set of presuppositions (assumptions which may be true, partly true or entirely false) which we hold (consciously or subconsciously, consistently or inconsistently) about the basic makeup of our world, and that provides the foundation on which we live, move and have our being'[4]

One of the problems with world views is that we are often not conscious of them until they are challenged, or we find ourselves abandoning them. The

2 McGrath, A, *The Great Mystery*, London: Hodder & Stoughton Ltd (2018) back cover.

3 McGrath, A, *Inventing the Universe*, London: Hodder & Stoughton Ltd (2015) back fly leaf

4 Sire, J, *The Universe Next Door*, 5th ed., Leicester: Inter Varsity Press (2010) p.17

testimonies of former Marxists, Freudians, National Socialists and converts to another religion etc. give evidence of the personal upheaval and often community estrangement involved in such a move.

Most academic scientists are instrumentalists in their presentation of research results: the questions of meaning and why should such things be so generally get left to discussions in the bar afterwards (when they often turn into critical realists!). But these big questions, the ultimate questions of life, are of major importance. McGrath, in *Inventing the Universe*, quotes the Spanish philosopher José Ortega y Gasset: 'Scientific truth is characterized by its precision and the certainty of its predictions. But science achieves these admirable qualities at the cost of remaining on the level of secondary concerns, leaving ultimate and decisive questions untouched.'[5]

These Ultimate Questions, I suggest, include:

1. What is the nature of this world and how do we discover it?
2. Why is there something rather than nothing?
3. How do our feelings and emotions affect our view of the world and others?
4. How do we determine a basis for morality and ethics?
5. What does it mean to be human – and what is the place of other species?
6. Is there a purpose for our existence – and how might we discover it?
7. What are our possible futures – and how might we discover them?
8. What sort of epistemology might enable us to frame answers to the above?

McGrath comments that a response to this will involve adopting one of three options[6]:

1. Ignore them as too difficult, irrelevant or uninteresting.
2. Believe that scientific enquiry is the only secure path to knowledge.
3. Hold multiple maps of meaning to answer such ultimate questions.

We can, of course, choose to ignore questions about ultimate meaning as too

5 *ibid*, p.144
6 *idem,* p.145

difficult or un-interesting at the present time. Or we may agree that they are interesting questions but fundamentally unanswerable and therefore spending time on them is pointless: just get on with life.

Or we may see that leaving the safety of a science that gives definite answers for 'the wastelands of philosophy or theology' is a deeply unattractive option and best well avoided. Far better to assume that scientists know what they are talking about; they alone can deliver hard knowledge: leave it to them; they deliver on the evidence.

It is difficult to see how anyone who has any knowledge of the development of quantum theory, cosmology or particle physics could be happy with such a position, for the evidence is frequently ambiguous and capable of more than one interpretation. The Copenhagen interpretation of quantum theory, developed by Bohr and Heisenberg, is by far the most widely accepted – and taught to undergraduates as the current state of knowledge – yet there are still adherents to hidden variable and other theories. Cosmological theories develop, and sometimes are proved quite wrong. Lev Landau, the great Soviet theoretical physicist, commented concerning his cosmologist colleagues that 'they are often in error but seldom in doubt'.[7] Such theories are proposed on the basis of the evidence available, but then often overtaken by new evidence.

In many other fields of enquiry where the evidence available is ambiguous and open to many interpretations the role of the researcher is to provide an *inference to the best explanation*, and then after that to seek other corroborating evidence. This is the process of abduction and is a powerful tool which has proved highly successful. Yet what seems at first to be the best explanation needs constant examination and we should always hold out our meta-truths and meta-narratives for inspection and criticism both by ourselves and others. Take for example major scientific theories, such as Quantum Theory, or the Standard Model of particle physics, where a central core of the theory is surrounded by other theories; hypotheses which are still to be tested and at times found wanting and in need of revision: yet the core remains until such time as a major re-appraisal takes place. This may well be a paradigm shift, which is itself for most participants a major upheaval in their 'beliefs'. Paradigm shifts are often associated with a startling counter-intuitive insight, of something assumed not possible, that on deeper examination turns out to be the key to the problem. Quantum theory and superconductivity are both in debt to counter-intuitive thinking.

It is misleading to see theology characterised as a discipline that deals in truth about the ultimate things and compare it with science that is always

7 This comment by Landau is widely quoted, often in slightly different forms, but never referenced. My authority for it is as a personal communication from J. C. Polkinghorne, who knew Landau and heard it from him!

open to revision and development. If either science or theology make claims to 'truth' they are mistaken; the purpose of science is to enable understanding.

Philip Bell, in his review[8] of Angela Potochnik's book, *Idealization and the Aims of Science* [9] observes that 'science is not after truth but useful, comprehensible, workable theories of the world. Understanding trumps truth'.

There has been something of a struggle over this distinction but now most science disciplines concede that total objectivity is impossible – we, the subject, are always part of the question with varying effects. Interestingly it is the quantum physicists, those supposed by the general public to be the most objective, who realise most acutely this problem: that the act of observing alters the state of that which is observed. At the level of the wave function this inability to know exactly what happens as a measurement is made gives rise to a number of competing interpretations of quantum mechanics.

More controversially, theology also cannot make claims to possess absolute truth, as this can only lie in God. Our theology is our best explanation, and missiologists such as Bevans and Schroeder[10] have shown how the church's answers have changed over the centuries.

Scientific enquiry continues apace and there are some who will have the opinion that science will be able to explain all in due time, holding to the second response to answering ultimate questions. Some of the 'ultimate questions' will be rejected as meaningless ('Why is there something and not nothing' is a frequent candidate). However, despite that it is far from clear how a strictly scientific evidence based approach can provide a framework for moral judgement other than saying that whatever benefits the species development will be right. Dawkins generated considerable controversy by applying this to the evolutionary desirability of aborting foetuses with identified abnormalities. He is not alone in this, the Australian social-philosopher Peter Singer also generates controversy in this area. Not all scientific naturalists would take such a strong view; many would recognise that there is a need for explanation for morals, aesthetic values, perceptions of beauty etc. but would separate such explanations and leave them to religion and metaphysics whilst maintaining that everything else is the realm of science. McGrath points out that the more doctrinaire would despise and ridicule such a soft approach, but that there are others who, whilst still being committed to a naturalist position, would be equally dismissive of those who fail to allow for any form of satisfactory answer to the deep questions of human existence[11].

8 Bell, P, 'Is Science really the only game in town?', *New Scientist*, 3 March (2018), 44-47

9 Potochinik, A, *Idealization and the Aims of Science*, Chicago: University of Chicago Press (2018)

10 Bevans, S & Schroeder, R, *Constants in Context: a Theology of Mission for Today*, New York: Orbis Books (2004)

11 *idem*, pp.147-150

McGrath's third option of multiple maps of meaning allows scientific enquiry its pre-eminence in explaining the natural world, its origins and its processes whilst also having additional maps that cohere with the scientific one: maps that explain that a God who creates the world is not going to be an object we observe within this universe Such a God, in the Judaeo-Christian tradition, is by his or her very nature a creator so then it is not unreasonable to find that creation reflects the properties of the creator. And if, in some way, we see human beings as occupying a special place in creation as rational, self-aware, creatures, then they too should exhibit some of the properties of the creator. This is the doctrine of humankind being created in the image of God. The Lutheran theologian Phil Hefner describes human beings seen in this light as 'created co-creators', a description full of resonances and possibilities which gives theological explanation as to why the human race is so curious and also so inventive, themes developed in his *The Human Factor*[12].

McGrath succinctly sums up his argument:

> So, does engaging with such questions mean abandoning science? No. It simply means acknowledging and respecting its limits and not forcing it to be something other than science. Christianity is able to enrich this vision of science – not by proposing itself as a competing science, but by being what it is and doing what it does best, which is raising and answering ultimate questions. Of course, it does much more than this – but it does it *distinctively* and it does it well. And it needs to be done[13].

A theistic, Judaeo-Christian world view, allied to a rigorous scientific understanding of the world we inhabit, constitutes a robust world view that can be held with integrity.

The *Theos* survey has shown that the mind of the general public, at least in the UK, has moved on from a simple conflict model. Whilst the proposition that science and religion are at least partly incompatible finds general favour; if the questions are more specific about which *particular* science conflicts with religious belief there is much less perception of conflict (particularly among religious believers). 'In reality, both science and religion are highly complex, contestable, polyvalent, terms which means the science and religion debate is similarly complex[14]'

The report draws out six different dimensions in the science and religion debate, which it examines in more detail, and suggests as a programme for the

12 Heffner, P, *The Human Factor: Evolution, Culture and Religion,* Minneapolis: Fortress Press (1993)

13 *idem*, p. 152

14 *ibid*, p. 3

future six key areas for deep end exploration[15].

1. **Epistemology**: how do we know what (we think) we know? (faith vs fact)
2. **Metaphysics**: what is the fundamental nature of reality? (natural vs supernatural)
3. **Hermeneutics**: how do we read texts, particularly authoritative religious ones? (literal vs metaphorical)
4. **Anthropology**: what does it mean to be human? (material vs spiritual)
5. **Ethics**: what is good and how do we progress as a society?(moral polarisation)
6. **Politics**: who gets to decide? ('playing God')

This is a rich agenda for future activity in the deep end.

The scientific and academic community are not the problem. The real problem posed in this paper is that the majority of the population, at least of Western society is still conditioned to think in shallow terms unless challenged by an interest in a particular area.

Most people never come to consider what sort of world view they are operating within. In the relics of Christendom, we may well profit from a residual belief structure that perhaps the 'God and Jesus Story' actually works. For many converts a feeling that they express is a sense of the 'rightness' of their new faith, that it 'fits', that it allows them to make sense of the world around them in a way that was not possible before. Such language is essentially experiential and not intellectual. Faith would seem to be caught, not taught.

In 1991 the South African missiologist David J Bosch wrote an essay on a missiology of Western culture entitled *Believing in the Future*[16] After an insightful analysis of Christian faith in a post-modern age he observed that, except in the Western world, theology and missiology were virtually indistinguishable, yet in Western theological departments missiology was almost totally absent, except as a pastoral addendum to ministerial students.

Bosch concludes his short essay by quoting Polanyi as to the consequences for humanity if we do not communicate the shallow inadequateness of its rationalism and materialism.

15 *idem*, pp.77-123

16 Bosch, D J, *Believing in the Future*, Leominster: Gracewing (1995)

> Then law is no more than what the courts will decide, art but an emollient of nerves, morality but a convention, tradition but an inertia, God but a psychological necessity.

Then man dominates a world in which he himself does not exist. For with his obligations he has lost his voice and his hope and has been left behind meaningless to himself [17]

This is a descent into nihilism, and the signs of this are clear in aspects of western society. How do we set about a missiological programme to counter this?

Bosch[18] claims that the problem lies in the way that the churches have regarded mission, or evangelism, as something that is done to others, to those outside; whereas he argues that Western theology should learn from the theologians of Asia and Africa that mission is the very heart of theology, not its outworking. Doctrine should be taught through mission; missiology is not a subset of doctrine. This is an outworking of the statement that 'It is not the Church of God that has a mission in the world, but that the God of Mission who has a church in the world.'[19]

The problem of relating science and faith is so often High School science and Sunday School religion. The problem is not so much in the academy – although debate can be fierce, the argument is by and large acknowledged to exist – but in the schools, churches and religious communities. Too few churches address seriously scientific theories of creation, life and death, human meaning, in their relation to sacred texts and traditions. So many school science teachers fail to indicate that there may often be other valid answers to a question than a purely mechanistic one from science.

The film version of Victor Hugo's book *Les Misérables* is a wonderful story of a life turned around. In the film the refrain is frequently that 'Another Story Must Begin'. Another story must begin in society and in the church. Theological faculties give the impression at times of being engaged in re-arranging the deck chairs on the Titanic rather than engaging in a theological understanding of society. Christian congregations all too often operate as safe fortresses from the hostile world outside, and clergy of all denominations still appear to regard their role as that of 'safeguarding their congregations against error in religion and viciousness in life'[20] rather than that of resourcing them in a society that has largely forgotten (or never knew) the Christian story. The US community

17 Polanyi, M, *Personal Knowledge: Towards a post-critical philosophy*, London: Routledge & Kegan Paul (1958), p.380

18 *ibid*, pp.17ff.

19 Dearborn T, quoted in *Mission Shaped Church*, London: Church House Publishing (2004) p. 85

20 *idem*, p.28

theologian Walter Bruegemann describes evangelism as 'the invitation to re-imagine our lives in these narrative modes'[21].

Some of us must be called to articulate that story.

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21 Breugemann, W, *Biblical Perspectives on Evangelism: Living in a Three-storied Universe*, Nashville: Abingdon Press (2011)

RAVI SCOTT JAIN

Science and Theology as Abductive Responses to Reality

This essay will address three of McGrath's specific contributions to the field of science and religion which have helped lay foundations for this discourse. First, he insists that in both science and theology 'ontology determines epistemology'. 'The way things are' should determine how we seek to know those things. Second, McGrath seeks to retrieve natural theology from its Barthian exile. Natural theology, according to McGrath, does not consist in trying to prove God without reference to revelation. Instead, natural theology shows that God's revelation comports with human reason; it consists in seeing nature as creation. This point then leads to a third observation about one of McGrath's signature lines of reasoning: the importance of abduction in both theology and science. The fruitfulness of "seeing as" is a sort of abductive argument. The essay concludes with further comments about the relevance of abduction for McGrath's vision of natural theology. Together these themes emphasize McGrath's analysis of the abductive aspects of science and theology as responses to reality.

Keywords: Alister McGrath, Natural Theology, Abduction, Ontology, Realism, Idealism, Stratified Reality, Charles Sanders Peirce, Thomas Aquinas

Introduction

In 2008 Alister McGrath convened a conference on natural theology called Beyond Paley at the Oxford Natural History Museum. The conference drew together scholars from a wide variety of disciplines ranging from palaeobiology to psychology. He called them to imagine a new natural theology. This ability to unite discourses and bring diverse thinkers together is one of McGrath's hallmark gifts. As myself a younger author who at the time worked on bridging the discourses of the sciences and the humanities, the foundations that McGrath laid were invaluable to my own thought. Prolonged engagement with McGrath's *The Science of God* provided intellectual foundations for a book I co-authored.[1] That book had a broad vision and argued for a superstructure for learning reminiscent of the great curricula of the medieval universities. It sought to resituate the natural sciences within natural philosophy; to resituate the social sciences within moral philosophy; and to recover the significance of piety, metaphysics, and theology for the entire curriculum. McGrath's thought

1 Kevin Clark and Ravi Scott Jain, *The Liberal Arts Tradition: A Philosophy of Christian Classical Education* Classical Academic (2013)

was a great help to us in developing these disciplinary imaginaries because McGrath's arguments for the unity of knowledge are deep. '*A positive working relationship between Christian theology and the natural sciences is demanded by the Christian understanding of the nature of reality itself*—an understanding which is grounded in the doctrine of creation. The Christian doctrine of creation demands a unitary approach to knowledge, while being responsive to diversity within that creation.'[2] In what way is all truth God's truth? Over the years, McGrath's thought has helped both me and others to answer that question with wisdom and nuance. I offer these introductory comments as a way to say thank you to Dr McGrath for working through the decades to provide these foundations for so many. The rest of this essay will address three of McGrath's specific contributions to the field of science and religion and conclude by showing their relationship to abduction.

Ontology Determines Epistemology

Many people in contemporary culture hold to a popular philosophical idealism. This does not mean that people are idealistic. Many embrace a naïve philosophical idealism on account of the habits, assumptions, and technologies of popular culture. McGrath's emphasis on ontology is a welcome antidote to the naïve idealism of the age. McGrath believes in the grounding power of extra-mental reality for our ideas. Because of this McGrath can find much commonality with thinkers as distant in time as Aquinas and Roy Bhaskar. All have a high regard for the reality of things. Bhaskar, with whom McGrath engages extensively, develops a neo-Aristotelian line of thought called critical realism which asserts that 'ontology determines epistemology.' 'The way things are' should determine how we seek to know them.[3] To believe the opposite: that epistemology determines ontology is the fundamental Cartesian mistake. Borrowing a line from Bhaskar, McGrath sets out the '"basic principle of a realist philosophy of science" as the belief "that perception gives us access to things and experimental activity access to structures that exist independently of us"'.[4] So McGrath is not merely an empiricist in this, but more than that he is a realist. Contrast McGrath's point of view with that of the empiricist John Locke who perhaps inadvertently lands in a prison of ideas cut off from the external world. Locke claims that ideas are 'the object of the understanding when a man thinks.'[5] For Bhaskar and McGrath the objects of the understanding are things

2 Alister E. McGrath, *A Scientific Theology*, Grand Rapids: W.B. Eerdmans (2001), p21.

3 Alister E. McGrath, *The Science of God: An Introduction to Scientific Theology*, Grand Rapids: William B. Eerdmans (2004), p107.

4 *Ibid.*, p141.

5 John Locke. 'Essay Concerning Human Understanding', in *Great Books of the Western World, Volume 33,* Encyclopaedia Britannica (1990), 95.

and structures that exist independently of us, while for Locke the objects of the understanding are ideas. Here is the philosophical problem of modern idealism in a nutshell.

A challenge for the anti-Cartesian thesis which McGrath advances, that 'ontology determines epistemology,"'is whether one can come to know the way things are (ontology) without error. McGrath notes a point made by Michael Polanyi, 'natural scientists find themselves having to believe some things that they know will later be shown to be wrong.' Hence unlike Descartes' approach or that of other foundationalists, McGrath's approach is fallibilist. 'neither the natural sciences nor Christian theology depend upon…[a foundationalist] philosophy; indeed both can be argued to develop approaches that avoid the pitfalls of the Enlightenment.'[6] Nonetheless, we must theorize. 'A scientific theology must extend to include both knowledge that arises through engaging with a reality that is encountered or made known, as well as the postulation of hypothetical entities or the formulation of such constructs as seem appropriate in attempting to represent that reality, however provisional.'[7] McGrath also summarizes John Polkinghorne to make his point, '…"theory and practice are inextricably intertwined in scientific thought," as a result of which scientific facts are to be understood *as having already been interpreted*. "There is an inescapable self-sustaining circularity in the mutual relationship of theory and experiment".' The phrase 'theory-ladenness' of observation might come to mind here. But this does not mean that we do not engage with reality; we do. Ian McGilchrist makes a similar point, 'We do actually deal with reality and know it, just with an aspect of it that we *partly call forth ourselves by our approach*.'[8] McGrath grapples with the question of how our various approaches to knowing things affect the way things are known, and the results of his investigation are fruitful. How much of creation do we respond to as outside of ourselves and ordered by God the divine Logos? And how much of creation do we, made in God's image, participate in bringing into being as new creation—whether these are hypothetical entities like electrons or points of Christian doctrine like the doctrine of the two wills in Christ? The role of abduction, which we will discuss later, is a key theme in McGrath's answer to this question. For now, let us consider how this question leads us directly to McGrath's conception of natural theology. There is a givenness to the world in creation and revelation and yet there is interpretive work for humans to do in both theology and science.

6 *op. cit.,* McGrath [2], p100.

7 *ibid.*, p94.

8 Iain McGilchrist, *The Matter with Things: Our Brains, Our Delusions, and the Unmaking of the World* London: Perspectiva Press (2021), p1052.

Natural Science and Natural Theology as Responses to Reality

On the one hand, McGrath believes there is a reality to which humans respond both in science and in theology, and he provides a philosophical grounding for it. On the other hand, McGrath recognizes that the nature of nature is disputable. 'Nature is…to be viewed as an interpreted notion, which is unusually vulnerable to the challenge of deconstruction.'[9] Affirming the relevance of a Christian interpretation of nature is a core point of McGrath's natural theology. 'Natural theology is to be understood as the enterprise of seeing nature as creation, which both presupposes and reinforces fundamental Christian theological affirmations.'[10] This seeing nature as creation historically did and can today continue to provide grounding insights to the methods and assumptions of the natural sciences. But additionally, that these insights and assumptions prove fruitful in the natural sciences makes the doctrine that nature is creation more plausible. Natural theology begins with the 'revealed insight that the divine rationality created both the world and the human rationality which reflects upon it…and can reasonably be argued to be the common wisdom of the Christian tradition.'[11] This both guarantees the dependability of reason for research in the natural sciences, and it ensures the notion that the world is an orderly place with discoverable structure. But seeing nature as creation is also able to explain the existence of trans-traditional features of human pursuits, such as mathematics and wonder or the quests for goodness and the divine, as McGrath argues. This vision of natural theology is broadly not just narrowly fruitful, *pace* Barth, both serving the sciences and benefitting theology. There are commonalities between the reasoning in science and theology. But, to borrow a word from Thomas Torrance, this reasoning should be *kataphysical*, which means reasoning about things according to their own kinds.[12]

This leads us to consider how McGrath's project offers insight particularly to theological method. McGrath insists that, like science, 'theology is a response to reality.'[13] But this reality is stratified. McGrath identifies a number of reality's diverse aspects to which theology responds: 'Texts (Supremely Scripture); Patterns of Worship; Ideas, such as those set out in creeds; Communities; Institutional structures; Images; Words; and Religious experience.' Theology is a response to all of these realities, especially these realities understood as divine revelation. McGrath acknowledges that there are things in theology which are fixed, like Scriptures (in their *autographa*) and Creeds (as originally received),

9 *op. cit.,* McGrath [1], 1:4.

10 *op. cit.,* McGrath [2], p113.

11 *op. cit*., McGilchrist [8], p71.

12 *op. cit.,* McGrath [2], p165.

13 *ibid.*, p94.

that stand beyond the flow of ever-developing doctrine. But his account of theological progress is also interesting.

How does the approach to theology as a response to the stratified reality of divine revelation provide new resources or resolve old dilemmas? One of the problems McGrath's theological method addresses is the relationship between theological tradition and theological development which has played no small role in conflicts ranging from the Protestant Reformation to Vatican II. This balance between tradition and development is reflected in McGrath's critique of 20th century theologian George Lindbeck. 'Lindbeck does not explain how doctrines are grounded in, or related to, reality. Lindbeck is unable to account for the phenomena of doctrinal development or respond to the need for theological reformulation and revision—such as the entire theological project of the Reformation.'[14] This is where McGrath's understanding of a stratified reality and especially God's self-revelation in Scripture solves Lindbeck's problem. McGrath claims the divine revelation in Scripture, creeds, and patterns of worship are all part of the reality to which theology responds. And McGrath also dignifies the human role in those responses to reality as can be seen by his affirmation of tradition and community. His discussion of John Milbank reflects this. 'Milbank is unquestionably right in his concern to reaffirm the importance of the Christian tradition.'[15] And so the role of communal interpretation and development is important as well.

Abduction in Natural Theology and Natural Science

From this vantage point we can now discuss the role of abduction in McGrath's thought. While I do not believe McGrath has written an article or a book explicitly on abduction, he does refer to it in different works. In *A Scientific Theology* he speaks of Peircean 'abduction to the best explanation' as 'underlying Kepler's reflections on…planetary motions and Darwin's on the origin of species.'[16] And in his recent book, *The Territories of Human Reason*, he argues that C.S. Lewis in theology 'makes use of what are clearly abductive strategies.'[17] In both of these books, *A Scientific Theology* and *Territories*, McGrath devotes a section to abduction in the natural sciences and then a subsequent section to abduction in Christian theology. In *Territories* he offers a tantalizing analysis. He says, 'this form of reasoning is not yet widely encountered within Christian theology, although there are indications that its considerable theological

14 *ibid.*, p104.

15 *ibid.*, p125.

16 *op. cit.,* McGrath [1], 3:154.

17 Alister E. McGrath, *The Territories of Human Reason: Science and Theology in an Age of Multiple Rationalities*, Oxford: Oxford University Press (2019), p180.

potential is coming to be appreciated.'[18] I think McGrath is right to note that theologians do not often think of what they do as abduction and that there is room for this recognition to grow, but I disagree with him on whether or not it has been widely used in theology. I would argue that throughout history, if perhaps not as much at present, it has been used. I would also like to suggest, I hope not controversially, that abduction is the essential method that McGrath himself employs in his approach to natural theology.

If one is willing to consider the proposition that abduction as a mode of thinking existed before Charles Sanders Peirce but with a different name, then perhaps it can be seen as a recognized method in medieval theology. In order to make this comparison between abduction and medieval theology first consider a cognate term for abduction. Since the hypothetico-deductive method may be a more familiar term to most than abduction, imagine abduction as the making of a hypothesis and considering it. In particular abduction is 1) the making of a hypothesis 2) showing the consequences of that hypothesis, and 3) then arguing for the reasonableness of that hypothesis based off of the observation that the consequences of such a hypothesis are occurring. If it is true that abduction is similar to the hypothetico-deductive method, then it should be no surprise that abduction has always been a key aspect of reasoning in the modern natural sciences, since the roles of hypotheses are a well-known feature of the natural sciences. McGrath himself notes that Peirce connected abduction and hypotheses. 'Peirce's language here suggests that abduction can be compared to the creative and aesthetic dimensions of human perception, in which the explanatory hypothesis "has to be invented *ex novo*"...'[19] But the role of hypotheses in theology is not always popular. In fact, in *A Scientific Theology* even McGrath distances himself somewhat from hypotheses in his concession to Plantinga's critique. 'For the community of faith, God is most emphatically *not* conceived simply as an explanatory hypothesis.'[20] Nonetheless, he goes on to argue in this section, which is on explanation in theology, that theologians can use 'abduction to the origins of the Christian tradition' and to its 'revelatory developments.'[21] Especially for the community of faith there is no question that God is real and he has *really* revealed himself. But regarding the contours of that revelation, abduction and perhaps even the use of hypotheses regarding the best way to summarize that revelation may be appropriate. Thus, McGrath recognizes a link between the two concepts, abduction and hypotheses, but urges one to use the notion of hypotheses with caution.

The notion of hypotheses is an ancient one, especially prominent in the

18 *ibid.*, p178.

19 *ibid.*, p177.

20 *op. cit.,* McGrath [1], 3:136.

21 *ibid.*, 3:162, 149.

ancient disciplines of mathematics. The role of hypotheses is embedded in ancient mathematics' fascinating method of analysis and synthesis, a method largely unknown today but somewhat revived by mathematician George Polya.[22] One of the reasons why the role of hypotheses increased in 17th century science was because the scientific revolution was led by astronomy, a mathematical discipline, through men like Copernicus, Galileo, and Newton. The role that hypotheses played in astronomy was well known throughout the medieval world and many knew since the time of the ancient Greek Aristarchus that the appearances of the heavenly motions could be saved equally well from either the hypothesis of heliocentrism or the hypothesis of geocentrism. The phrase 'saving the appearances' comes to mind. Geocentrism was favoured for other reasons, especially having to do with Aristotelian physics. It is this background idea of hypotheses in astronomy that animates the following comment from Thomas Aquinas about the Trinity.

> There are two kinds of argument put forward to prove something. The first goes to the root of the matter and fully demonstrates some point; for instance, in natural philosophy there is a conclusive argument to prove that celestial movements are of a constant speed. The other kind does not prove a point conclusively but shows that its acceptance fits in with the observed effects; for instance, an astronomical argument about eccentric and epicyclic motions is put forward on the ground that by this hypothesis one can show how celestial movements appear as they do to observation. Such an argument is not fully conclusive, since an explanation might be possible even on another hypothesis…
>
> In the first way, we can prove that God is one; and the like. In the second way, reasons avail to prove the Trinity; as, when assumed to be true, such reasons confirm it.[23]

Thomas identifies the role of hypotheses in astronomy and compares them with a kind of reasoning in theology. This is analogous to McGrath's claim regarding abduction. Thomas says regarding the Trinity, 'reasons avail to prove the Trinity; as, when assumed to be true, such reasons confirm it.' This is the essence of abduction and the essence of McGrath's strategy for natural theology mentioned earlier. 'Natural theology is to be understood as the enterprise of seeing nature as creation, which both presupposes and reinforces fundamental Christian theological affirmations.' It presupposes theological affirmations, but

22 See George Pólya, *How to Solve It: A New Aspect of Mathematical Method*, Princeton: Princeton University Press (2014), p142.

23 Thomas Aquinas, "1A.32.1.Ad2," in *Summa Theologica*, trans. Fathers of the English Dominican Province (London: T. Baker, 1920). First section of translation taken from James A. Weisheipl, "The Commentary of St. Thomas on the De Caelo of Aristotle," in *Thomas Aquinas: Contemporary Philosophical Perspectives*, ed. Brian Davies, Oxford University Press (2002), p49.

it also reinforces them. Rewriting this idea to mirror Thomas' language might read like this, 'reasons avail to prove that nature is creation; as, when assumed to be true, such reasons confirm it.' Of course, this should not surprise us too greatly since McGrath considers his own project of natural theology to parallel Aquinas' approach in the *Summa Contra Gentiles*.[24]

So, uncontroversially, I conclude along with Peter Harrison that McGrath's project of natural theology does truly comport with a historic approach to a theology of creation.[25] But, on the other hand, I must disagree with one of McGraths' minor judgements here. It seems to me that if Thomas is representative of others, then the use of abductive arguments has actually been a well-trod feature of theological reasoning for millennia—although never called such. Thus, McGrath should continue to draw out with confidence one of his favorite quotes from C.S. Lewis which is another abductive argument. 'I believe in Christianity as I believe that the sun has risen, not only because I see it, but because by it I see everything else.'[26] Or mirroring Thomas' language again, 'reasons avail to prove Christianity; as, when assumed to be true, such reasons confirm it.' Hence along with his emphasis on realism, I believe that his retrieval of natural theology in this abductive key is one of McGrath's hallmark contributions not only to the science and religion dialogue but also to theology more broadly in the 21st century.

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24 *op. cit.,* McGrath [2], p71–72.

25 Peter Harrison, "What is natural theology? (and should we dispense with it?)," *Zygon* 57, no. 1 (2022): 114–40, https://doi.org/10.1111/zygo.12767.

26 C. S. Lewis, "Is theology poetry," in *The Weight of Glory: A Collection of Lewis' Most Moving Addresses,* Glasgow: William Collins (2013), p140.

HUMBERTO SCHUBERT COELHO

The place of a scientific theology among theological disciplines

The demand for a scientific theology arose from the progressive decline of dogmatic theology throughout the Seventeenth and Eighteenth centuries. A variety of natural theologies emerged, intended to purge theology from its supernatural religious traces and language, to achieve the 'purest form' of a rational theology independent from cultural additions, such as Christology and the role of institutions such as the church. This movement produced at least two distinct reactions in the transition to the Nineteenth century: romanticism and systematic theology. Romantics reacted to the dryness of natural theology by emphasizing the supernatural and the narrow limits of human understanding, sometimes degenerating into irrationalism. Systematic theology, heavily inspired by German Idealism, tried to rehabilitate core theological concepts into a new, more respectable fashion. Friedrich Schleiermacher is a key name for both movements, and his theories are representative of the problems encountered by these enterprises. Later, under the influence of modern traditionalists such as Karl Barth and John Henry Newman, systematic theology stepped back to give space to a renewed dogmatic theology, which would take the basic and original claims of Christian revelation more seriously. The rehabilitation of a more traditional theology, however, created a renewed demand for the accommodation of theology to contemporary scientific knowledge. Alister McGrath's Scientific Theology is among the most significant efforts in that direction.

Keywords: Theology, Science, Philosophy, Natural Theology.

After the dramatic movement towards a naturalized theology in the 18th and 19th centuries, theologians realized that the rejection of core Christian principles and ideas could be detrimental to the very purpose of theological reflexion. The relative waning of natural theology, therefore, stimulated the return to traditional or dogmatic approaches compatible with the modern hermeneutic methods. As natural and liberal theologies – and other forms of criticism against traditional Christian theology – proved resilient, however, the theological dynamics of the 20th century became progressively more complex, with both episodes of harmonization and conflict between traditional Christian theology and the secularized critical theologies.

Drawing on each of these traditions, Alister McGrath speaks about a 'perennial presence of the transcendent' across human cultures, defining transcend-

ent as a matter of ultimate concern, in contrast to the transitory and relative concerns of mundane life.[1] Such a philosophical perspective allowed him to avoid the most common vices of the radicalized positions. Yet, in place of a theological reductionism of science or a scientific reductionism of theology, McGrath became the advocate of a new perspective he called scientific theology. According to him, 'A scientific theology conceives the theological enterprise as a principled attempt to give an account of the reality of God, which it understands to be embedded at different levels in the world'.[2] We will return to this later.

As we can easily see, a new theological discipline that shows close connections with the traditional disciplines specialized in the relationship between contemporary science and theology has to be carefully distinguished from any of them. In our paper, we will give emphasis to the two greatest attempts of building a bridge between faith and reason in Modernity: natural theology and systematic theology. These examples would help us to make clear how exactly McGrath's proposal of a scientific theology differs from previous attempts of solving the perceived schism between religion and science, and in which sense it proves itself superior to them.

As the proposal shows signs of being a synthesis, we must begin by understanding the models presupposed by it. The main two ideas connected by scientific theology are scientific realism – closely related to critical naturalism – and Christian theology.

Writing a generation after Ian Barbour, McGrath does not indulge in the Modern notion of a conflict between science and religion. On the contrary, he acknowledges a great deal of recent theological attempts to address the worldview where the sciences have been enjoying tremendous success for two or three hundred years. He therefore, gives a special consideration to natural theology, which traces to the earliest Christian witness, as Paul's message to the Romans attested: 'For since the creation of the world God's invisible qualities, His eternal power and divine nature, have been clearly seen, being understood from His workmanship, so that men are without excuse' (Rom 1:20). The inexcusable men were those who did not discern God through His creation. Simplifying a bit, Tom Holland asserts, 'To accept Christ was to accept that God could write his commandments on the heart.'[3]

In this stream of theology, Christian revelation and tradition were never in

1 McGrath, A. E. *The Open Secret: A New Vision for Natural Theology*. Malden: Blackwell (2008), p. 26.

2 McGrath, A. E. *A Scientific Theology. Vol. 2: Reality*. Michigan: William B. Eerdman's. (2002), p. xi.

3 Holland, T. *Dominion: How the Christian Revolution Remade the World*. New York: Hachette Book Group (2019), 186.

conflict with reason. The greatest thinkers and philosophers were almost exclusively Christian for almost eleven centuries. This was before the notion of a conflict between faith and reason was conceived in Modernity. And Modernity was shaped by the distinct piety of men and women such as Jan Huss, Erasmus, Martin Luther, Teresa D'Avila, Ignácio de Loyola, John Calvin.

In another description of Holland, 'Martin Luther… appealed for the first time to a concept that he had discovered in Paul: "I must believe according to the testimony of my conscience."'[4] This ethical notion of belief is not dissimilar to Luther's notion of faith. In contradiction to the irrationalist interpretations of Luther, his concept of faith was not opposed to reasoning, even if he stressed that reason could not be the source of faith. Though he saw faith as superior to reason, Luther never argued that they were in contradiction. He also distinguishes a mundane and unsanctified reason from regenerated reason.

The reason that produces natural theology, therefore, is not necessarily wrong, but it is a blind tool that can be played for the profit of evil. Only through atonement can reason be purified from its instrumental neutrality and brought to the service of salvation. Translating this to the judgement of natural theology, a natural theology useful for salvation could not be independent from or in contradiction with revelation. The point here is that the faith granted by revelation should never be judged by the standards of a natural or philosophical theology, but this is not to say that revelation is self-evident in all its subtleties, rendering rational interpretation useless.

Although McGrath's conception of natural theology is far more positive, the analogy with Luther is fruitful for it helps us remember that natural theology might not always be the best ally of Christian theology. As we well see later, the necessity of remaining in the register of positive theology, avoiding the risk of a purely philosophical (i.e. abstract) concept of theology, makes it relevant to stress that Christian theology is grounded on the positiveness of revelation (as kerygma as well as a historical fact), while natural theology can be purely theoretical.

Consciously echoing Alvin Plantinga, however, McGrath points to Thomas Aquinas and John Calvin as the original inspirers of natural theology. Since both regarded the harmony between reason and revelation as stated by revelation itself, the original seeds of natural theology did not assume a conflict between science and religion, or reason and faith. It is relevant, therefore, to understand how natural theology, a project originated from the heart of theology, ultimately divorced from it in order to attempt a new foundation of theology that would ultimately oppose revelation.

To be brief, we could mention Baruch Spinoza's concept of a God of pure rea-

4 *Ibid*, p. 312.

son, considering reason in a very mechanistic sense. A contemporary of Robert Boyle, who was a natural theologian in a more traditional sense, Spinoza disparaged Scripture as an incoherent and unlearned treatise about God. While containing some justifiable maxims of practical wisdom and the generally correct sense of the supremacy of God over individual beings, Scripture should be regarded as a collection of statements for which no demonstration is offered. Reason could do better, offering exact and irrefutable proof for each and every one of its postulates.

Spinoza was a powerful inspiration for French philosophes of the Eighteenth century. Voltaire, the greatest of the *philosophes*, was very specific in his attacks on Scripture and revelation. In his *L'Evangile de la Raison* – the Gospel of Reason, a very suggestive title – he says that no religion can be true if it contains errors in the core of its doctrine. By an error he understands anything that would separate mankind and produce trouble.[5] Sanctity should be identified with virtue, and it did not matter to Reason if virtue was manifest by a Pagan, a Muslim or a Christian. The alleged superiority of Christianity was only supported by belief in miracles, but all religions claim that their miracles are true and the miracles of the others are demonic.[6] Finally, Christianity demands from its followers some irrational beliefs. One cannot be a Christian without assuming a major contradiction, namely, that one God can be three. The idea of a triune God, he says, actually produces three gods.[7] It would only make it worse to say that, from these three that are different and same, the second and the third are begotten by one original, which does not make them less original or divine.[8]

While a bit simplistic, Voltaire's arguments were common ground throughout the Eighteenth century. The Jewish philosopher Moses Mendelssohn, for example, argued that Judaism should be regarded superior to Christianity in the extent that it only demanded virtue as means to salvation, while Christianity would depend on absurdities, such as the claim that a person was the absolute God incarnated. In making such belief a priority, Christianity would fail to address all mankind, while Judaism would assume that every moral person would be saved.[9] The interesting point here is not Mendelssohn's criticism of Christianity, but the fact that this criticism is based on a depiction of Judaism that was highly embedded in the Enlightenment's notion of natural theology, which would hardly correspond to rabbinical tradition and its understanding

5 Voltaire, F. M. A. *L'Evangile de la Raison, ouvrage philosophique*. Paris: Du Laurens (1765), p. 7-8.

6 Idem

7 *Ibid*, p. 46.

8 *Ibid*. p. 46.

9 Gottlieb, M. *Moses Mendelssohn Writings on Judaism, Christianity and the Bible*. Waltham: Brandeis University Press, (2011), 3.

of revelation.

The turn to a more dogmatic approach to theology was based on the rather obvious perception that natural theology had no need for revelation and the theological tradition. Similar detachments from theology occurred in fields such as natural history, that would slowly give place to non- or even anti-religious perspectives, according to the growing mythic narrative of a conflict between science and religion in the nineteenth century.[10]

The greatest name in this movement was Friedrich Schleiermacher. He offered both a philosophy of religion, in the sense of a natural theology, and a dogmatic theology that rehabilitated Christian dogmatics. Aware of the ill effects of enlightened natural theology on the Christian faith, Schleiermacher realized that a philosophical natural religion was not an ideal ally to Christian theology. However, he did not believe that natural religion was in contradiction with Christianity either, and he developed a romantic approach to natural religion and a Christian dogmatics that could be reconciled. He thus opened the way to mutual understanding between a progressive natural sense of divinity and revealed truth. While natural religion was available to all rational beings, its development and concrete forms would be social and cultural structures in the orbit of positive revelation. To speak about natural religion would be similar to speaking about gravity as a principle, and to speak about revelation would be similar to speaking about the actual stars and how the planets revolve around them.

While cognizant of their achievements, McGrath does not succumb to the limitations of systematic theology as it was conceived by German idealists or more recent traditionalists. He strives for a scientific theology, not a theological

10 'The transformation of natural history into scientific "biology" was a vital part of this process. Whereas natural history had traditionally been dominated by the clergy, the new scientific disciplines of biology and geology gradually achieved independence from clerical influence while at the same time legitimizing a new set of non-ecclesiastical authorities. This was in fact the explicit mission of such figures as Thomas Huxley and his colleagues in the "X-Club," who sought with an evangelical fervor to establish a scientific status for natural history, to rid the discipline of women, amateurs, and parsons, and to place a secular science into the center of cultural life in Victorian England. It served the political purposes of this clique to deploy a rhetoric of conflict between theology and science, a conflict that was supposedly not unique to the nineteenth century but had characterized the ongoing relation of these two hypostasized entities. Largely as a consequence of the efforts of those who sought to promote the political fortunes of "science," there emerged the historical thesis of an ongoing science-religion conflict—a view epitomized in the now unfashionable histories of Andrew Dickson White and John Draper. A good sense of the general tenor of these works can be gleaned from their titles, respectively, *A History of the Warfare of Science with Theology in Christendom* (1896) and *History of the Conflict between Religion and Science* (1875). The enduring legacy of this group, however, has been the perpetuation of the myth of a perennial warfare between science and religion".' Harrison, P. '"Science" and "Religion": Constructing the Boundaries'. *The Journal of Religion 86*, 1, (2006), 81-106 (p. 87).

accommodation of scientific data – if we have to give one example, we could mention Wolfhart Pannenberg – nor a scientific reinterpretation of theological principles as the lower status of symbols and metaphors. Instead of these common options in contemporary debate, McGrath envisions a third alternative, in the link between positive or dogmatic theology and the positivity of scientific realism. He even portrays this return to the positivity of religion as an evidence of the perennial appeal of the transcendent, for which his book *The Open Secret: A New Vision for Natural Theology* is the best reference.

Analysing Iris Murdoch's peculiar platonic position about the transcendent McGrath argues that such reactions to the mainstream rejection of the transcendent, in the 1960s and 1970s, reflected a 'want' created by this very rejection, which he attributed to the 'metaphysically impoverished' culture of the time.[11] McGrath's insight into the metaphysical – or, to be precise, the anti-metaphysical – ground for the rejection of the transcendent draws attention to a major trend in contemporary philosophy: the death of metaphysics.

In their attack on metaphysics, many parties claimed responsibility for eliminating the second greatest obstacle to the advancement of science after theology. Authors such as Auguste Comte, Karl Marx, Friedrich Nietzsche and Sigmund Freud proudly announced the glories of the new-born sciences, presuming that such glories derived from the death of metaphysical thinking. For over a century, scientists and even philosophy professors believed that non-metaphysical sciences were not only possible, but in fact superior to methods and sciences grounded in the principles of a first philosophy.

Here it is essential to raise some criticism of McGrath's attribution of responsibility, for he condemns idealism, perhaps the greatest defence for metaphysics, as one of the criminals.

McGrath's insistence on dogmatics above systematics and his praise for orthodoxy, represented by the theologians he quotes most, such as Karl Barth and Thomas Torrance, followed by Schleiermacher, Brunner, and Calvin, is in sharp contrast with the rigorous demands he imposes on metaphysics. While extremely critical of foundationalism, idealism (even critical idealism) and anything else showing a semblance of a priori reasoning, he seems to welcome Christian dogmatics without such restrictions. In addition, without any reference to Hegel, the major idealist to be refuted in a strong criticism of that school, McGrath reduces idealism through the very common caricature of anti-realism, which pretty much resembles similar criticisms he so frequently raises against reductive naturalism. To depict idealism as nothing but anti-realism does not do justice to objective idealism, for example, which reaches the same conclu-

11 McGrath, A. E. *The Open Secret: A New Vision for Natural Theology*. Malden: Blackwell (2008), p.48.

sion McGrath is trying to construct. Schelling's positive philosophy and Hegel's insistence on truth as a result – and not a priori – seem to me good models for many of McGrath's positions. It is also relevant to mention that many idealists recognize the Christian roots of this metaphysical stance, and, to some extent, it is incongruous to be an idealist without also being a Christian. However, as I argued in my paper on Hegel's concept of God, it is also true that some idealist definitions of Christianity are unpalatable to Christian orthodoxy.

As idealism does not play a fundamental role in *A Scientific Theology*, I do not intend to dedicate more time to defending idealism. The role McGrath's representation plays pedagogical, or even symbolical, and, in this sense, fulfils its purpose, which is to emphasize the absolute necessity of building the bridge between science and theology on facts. As I understand McGrath, this is the central thesis of *A Scientific Theology*.

Facts are the positive connections with reality outside human minds, and, therefore, essential to both science and theology, as disciplines that learn from reality. If more space and more serious consideration to pure philosophy in the overall method of scientific theology had been given, its place would have been rearranged to deal with idealism more systematically, but this was not the case. A greater importance to philosophy would most certainly drift the entire project in the direction of a systematic theology, which was not the point. As the example of Paul Tillich's *Systematic Theology* shows, 'The point of contact between scientific research and theology lies in the philosophical element of both, the sciences and theology. Therefore, the question of the relation of theology to the special sciences merges into the question of the relation between theology and philosophy.'[12]

However, again, McGrath is not trying to build a systematic relation between science and theology,[13] but a scientific theology. This has to be further highlighted if we are to understand the exact difference between these approaches.

In scientific theology, philosophy has a limited role, restricted to specific problems that require or emphasize stronger versions of realism as the only suitable solutions. Consequently, I agree with McGrath that the path he chose to support scientific theology was the most suited, if not inevitable.

The best way to triangulate McGrath's position, particularly regarding realism, is from the central Twentieth century thinkers in his book: Roy Bhaskar, Karl Barth and Thomas Torrance. Curiously, these names are well distributed

12 Tillich, P. *Systematic Theology*. Chicago: University of Chicago Press, 1951, p. 18.

13 A task to which I dedicated some effort in Humberto Schubert Coelho. 'A filosofia como juíza: considerações epistemológicas e histórico-culturais sobre o cisma entre ciência e religião'. In Simanke, Richart T., Bocca, Francisco V. Murta, Claudia (Ed.). Psicanálise em Perspectiva VII. Curitiba: Editora CRV, (2018).

in the spectrum between science and theology: Bhaskar, an advocate of scientific realism; Barth, a dogmatic theologian and advocate of Scriptural authority; Torrance, in between.

In *Ground and Grammar of Theology*, Torrance writes:

The ultimate end of Christian Theology is undoubtedly the knowledge and enjoyment of God for his own sake, but this knowledge and enjoyment arise within the relation of God the Creator to the universe he has made and within which he has set man, who is known within traditional theology as "the crown of creation." It is in and through the universe of space and time that God has revealed himself to us in modes of rationality that he has conferred upon the creation and upon us in the creation, and it is in and through the same universe of space and time that theology makes its disciplined response to God's self-revelation. The understanding of this universe, which is the prime aim of our natural scientific inquiries, can only be of deep interest to theology.[14]

Although very close to McGrath's proposal, Torrance's notion does not overcome the limitation of a fragmented vision. He builds analogies and connections between science and theology, and correctly understands that both are linked through realism, but he does not present a scientific theology. According to McGrath:

A scientific theology conceives the theological enterprise as a principled attempt to give an account of the reality of God, which it understands to be embedded at different levels in the world. Declining to make a priori prejudgements concerning what may be known of God, and the manner by which that knowledge should be established, a scientific theology approaches such questions in the light of what is actually known about God. A scientific theology thus conceives itself as an a posteriori discipline, responding to and offering an account of what may be known of God through revelation, taking full account of the stratified nature of that knowledge of God.[15]

McGrath is in fact creating a new discipline, which is based on a fallibilist and progressive account of the reality of God, according to the actual knowledge the natural world can provide about God. Such discipline demands from its scholars a great familiarity with both science and theology, but it offers an extraordinary advantage in return, for, thanks to scientific theology, the cultural gap between theology and science has no methodological reason to exist anymore.

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14 Torrance, T. *The Ground and Grammar of Theology*. Edinburgh: T&T Clark (1980), p. 1.

15 McGrath, A. E. *A Scientific Theology. Vol. 2: Reality*. Michigan: William B. Eerdmans. (2002), p. xi.

MICHAEL BOROWSKI

Revisioning 'Wissenschaft': Mining Alister McGrath's development of 'Pictures' and 'Imagination' for the General Philosophy of Science

While there seems to be a need to reconceptualize 'Science', little has been offered on how to do so. In this essay, McGrath's more recent work is mined by asking how this work could support such a reconceptualization. It is argued that McGrath has increasingly made use of concepts such as 'pictures' and 'imagination' as means to conceptualize an alternative way of perceiving (and practicing) science, and in which a broader understanding of science – Wissenschaft – can hence be revisioned.

Keywords: McGrath, General Philosophy of Science, imagination, big pictures, theory-construction

Introduction: Turning to McGrath for revisioning 'Wissenschaft'

As Stathis Psillos has argued, there is a need for reconceptualizing major tenets within 'science'.[1] One could suggest that the overall absence of an agreed definition of science might go along with the need for reconceptualizing 'science' itself.[2] If that is so, the question arises how one could hope to accomplish such a goal. The proper context to carry out such a task, as Psillos himself argues, would be the general philosophy of science. But there seems to be little work done so far in this field in this regard, and even Psillos himself offered no further work in response to such a call. Yet, for exploring the options and the work already being done in this regard, we may turn to the more recent contributions of the former Andreas Idreos Chair of Science and Religion at Oxford University, Alister McGrath.

McGrath wrote an important *Introduction* to the field of science and religion

1 Psillos, S. 'Having Science in view', In Humphreys, P. (ed) *The Oxford Handbook of Philosophy of Science*: Oxford University Press (2016), pp. 137-160.

2 What I am referring here to when speaking of science is not the narrower understanding of it, as in natural science, but the broader understanding of it, as in the German term 'Wissenschaft'. See also Borowski, M. 'On Revisioning Science' *Reviews in Science, Religion and Theology* (forthcoming 2023).

in 1999, which was updated with a second edition in 2010, and a third in 2020[3]. In the most recent of these, McGrath himself points out in the preface that there are considerable changes between the second and the third editions. It seems, however, that these changes are not just changes in the structure of the content, but even within the emphasis he puts forward as essential in the field of science and religion, moving from a more descriptive to a more constructive approach. For while the first editions cover topics, developments, discussions and proponents, the third one seems to be more focused in its own line of argument, starting out with the question of why one should study science and religion in the first place. And his answer is crucial: He submits that studying science and religion is important because, in bringing together science and religion, we ascertain a 'stereoscopic view of reality denied to those who limit themselves to one discipline's perspective.'[4] By drawing on the Spanish philosopher José Ortega y Gasset, he continues: 'We need a "big picture", an "integral idea of the universe".'

This notion of a big picture, the importance it has for the whole enterprise of science and religion, and for what both science *and* religion represent, was not so prominent in the earlier editions of McGrath's *Introduction*. And while the themes were in fact in place, concepts of a big picture or imagination had no explicit place in McGrath's scientific theology.[5] In this paper I argue that this theme has always has always has been there, it has become more tangible over the last two decades – in particular in his works on natural theology, nature, reason, and natural philosophy, as well as in the overall themes of 'pictures' and 'imagination'. By tracing the latter, I will conclude that it is this very focus which might be the centre and the largest achievement of McGrath's work to date: we will look into – and 'mine' – the 'big four'[6] of McGrath's works in the last two decades (while leaving the 'minor four'[7] on the side, as space does not

3 McGrath, A. *Science & Religion: A New Introduction,* Wiley (1999, 2010, 2020).

4 McGrath, A. *Science & Religion: A New Introduction,* Hoboken: John Wiley & Sons (2020) p.2.

5 See, for instance, the table of contents of McGrath, A. *The Science of God*, London: T&T Clark (2004), which functions as an introduction to the three volumes of McGrath's scientific theology, and which does not include either terms at all.

6 McGrath, A. *Natural Philosophy: On Retrieving a Lost Disciplinary Imaginary*, Oxford: Oxford University Press (2022); McGrath, A. *The Territories of Human Reason: Science and Theology in an Age of Multiple Rationalities*, Oxford: Oxford University Press (2018); McGrath, A. *Re-Imagining Nature: The Promise of a Christian Natural Theology,* Hoboken: John Wiley & Sons (2016); McGrath, A. *The Open Secret: A New Vision for Natural Theology*, Hoboken: John Wiley & Sons (2011).

7 McGrath, A. *The Great Mystery: Science, God and the Human Quest for meaning*, London: Hodder & Stoughton (2017); McGrath, A. *Enriching Our Vision of Reality: Theology and the Natural Sciences in Dialogue,* West Conshohocken: Templeton Foundation Press (2017); McGrath, A. *Inventing the Universe: Why we can't stop talking about Science, Faith and God*, Paris: Hachette UK (2015); McGrath, A. *Surprised by Meaning: Science, Faith, and how we make Sense of Things*, Louisville: Westminster John Knox Press (2011).

permit a more extensive interaction with them). We will do so by synthesizing the themes of 'pictures' and 'imagination' in McGrath's major work, suggesting that what McGrath has been doing over the past two decades can be seen as the primary to revisioning what modernity widely perceives – and relies upon – as 'Wissenschaft'. In doing so, McGrath has brought into focus concepts that might represent broadly unchartered, but powerful means also for reconceptualizing science.

Mining the building blocks: four volumes on reality and its analysis

In *The Open Secret*, McGrath seeks to develop a 'distinctively Christian approach to natural theology', in order to establish approaches on more secure intellectual foundations. He construes natural theology as the systematic exploration of a proposed link between the everyday world of our experience and an asserted transcendent reality. McGrath characterizes this book as an essay to open conversation, redirect thinking, and explore new options. In particular, he argues that 'if nature is to disclose the transcendent, it must be "seen" or "read" in certain specific ways – ways that are not themselves necessarily mandated by nature itself. It is argued that Christian theology provides an interpretative framework by which nature may be "seen" in a way that connects with the transcendent.'[8] The enterprise of natural theology, McGrath continues, would thus be one of discernment: 'of seeing nature in a certain way, of viewing it through a particular and specific set of spectacles.' In a section dealing with big pictures, McGrath argues that more recent theistic writers would have emphasized the importance of belief in God in explaining the 'big picture' – i.e., '*the overall patterns of ordering which are discerned within the universe.*'[9] McGrath refers to Richard Swinburne and his stance that the 'explanatory aspects of theism are not limited to the fine details of reality, but extend far beyond these to embrace the great questions of life – those things that are either "too big" or "too odd" for science to explain',[10] e.g. the anthropic phenomena (i.e., one aspect of natural theology's capacity to make sense of things). The concept of imagination is even more prominent in this work, for which McGrath gives credit especially to C.S. Lewis in this regard. He suggests drawing on Lewis' work for an imaginative approach to natural theology (i.e., one that acknowledges and affirms the ordering of the world as well as its appeal to human reason), 'but nevertheless insists on the full recognition of the role of the imagination in any human response to the world. The world, for Lewis, points to something

8 McGrath, A. *The Open Secret: A New Vision for Natural Theology*, Hoboken: John Wiley & Sons (2011), Chapter 1.

9 *Ibid*.

10 McGrath, *op.cit.* (7), Chapter 10.

beyond it which needs to be engaged with the imagination, rather than the intellect.'[11] In his third part – after discussing the human quest for transcendence and the foundations of natural theology – McGrath turns to an agenda for a renewed natural theology. He starts with emphasizing the aspect of *perceiving* nature – a process that would involve thinking/knowing about, affectively responding to, and enactive interaction with the world,[12] which is why McGrath addresses three aspects of truth, beauty, and goodness in his agenda. While the details of these discussions go way beyond the scope of this essay, we must highlight that it is the perception of nature that is fundamental for McGrath; perception that falls in line with the focus on a picture, and the emphasis on the imaginative realm as that faculty that brings things together.

Secondly, in *Re-Imagining Nature* McGrath sets out to 'explore what a properly Christian approach to natural theology might look like, and how this relates to alternative interpretations of our experience of the natural world.'[13] In doing so, McGrath closes in on the aspects of picture and imagination as in no other contribution, and the interconnection of the two of them is as close as it could possibly be: in his first chapter McGrath defends his 'Christian' natural theology project by highlighting the fact that despite 'postmodern chastenings, the appeal of a "Grand Theory" has never disappeared,' and that in disciplines as diverse as sociology and theology, there is a growing interest in 'retrieving the notion of a "big picture" – a way of seeing things which aims to frame and hold together as the elements of our experience and observation.'[14] Needless to say, Christianity would offer such a big picture. And it is in that very paragraph that McGrath introduces the concept of imagination, referring again to C.S. Lewis, by stating that 'Lewis held that the Christian imaginarium allows the beauties of nature to be correlated with an "indescribable something of which they become for a moment the messengers".' As there would be concerns of the way natural theology would operate (basically in place since the early modern period),[15] McGrath suggests that the Christian imaginarium would offer an imaginative and cognitive framework which is able to accommodate and position this classic notion of natural theology[16] – a task he attends to in the following chapters.

11 McGrath, *op.cit.* (7), Chapter 10.

12 McGrath, *op.cit.* (7), Chapter 9.

13 McGrath, *Re-Imagining Nature: The Promise of a Christian Natural Theology,* John Wiley & Sons (2016), p.1.

14 McGrath, *op.cit.* (12), p. 25.

15 McGrath summarizes four of such concerns: natural theology might seem to assume a culturally invariant notion of human reason; to fail to recognize the constructive activity of the human mind in the process of observation; to fail to appreciate the importance of tradition-mediated rationalities; and to express being inattentive to the aesthetic, moral, and intellectual ambiguity of nature.

16 McGrath, *op.cit.* (12), p. 36.

Here, again referring to Lewis, McGrath asserts that the human imagination plays a leading role in grasping the 'big picture' in that it is more easily perceived than actually understood. The imaginarium provides a conceptual framework for exploring the interplay of reason and imagination within a Christian natural theology, offering a way of looking at things in which 'a creative imagination is wedded to an acute intellect.'[17] It somewhat underlines the limits of the human sensorium.[18] Yet as in the concept of metanoia (i.e., repentance or turning about), the Christian imaginarium comes with the divinely transformed capacity of seeing and understanding reality,[19] providing 'ontological security for the semiotic link between the natural world and God,' [20] a way of 'seeing things which appeals to the imagination as much as to the reason, reflecting the signifying practices and conventions of the Christian faith.' Hence: 'This Christian "way of living, seeing and making" is affirmed, enacted, embodied, and transmitted by the Christian community.'[21] After all, with *Re-Imagining Nature* McGrath closes in on the distinct project of a natural theology. The element of nature's perception is taken up by his focus on a specifically Christian imaginarium – 'an intellectual and imaginative framework which both reaffirms the rational transparency and the inherent beauty of nature, and grounds these in the deeper reality of a Trinitarian vision of God.'[22] McGrath will elaborate more closely on the interconnection with that capacity usually referred to with his next major work: reason.

While the previous works explicitly take a theological and Christian perspective, the following two seem to take into view a broader and eventually, a somewhat secular one. In the earlier of these two contributions, McGrath aims to 'establish the understandings of rationality as both theory and practice encountered within professional communities in both the natural sciences and Christian theology, and to avoid simplistic reductions to allegedly "essential" or "universal" characterizations of either "science" or "religion", or the rational practices or criteria which emerge within them.'[23] He argues that 'we may live in a world that is an ontological unity, but this world is investigated and represented on the basis of an epistemological pluralism, offering us a bricolage of unintegrated insights and perceptions arising from different disciplinary or cultural perspectives on our world, or scientific engagement with its different

17 McGrath, *op.cit.* (12), p. 2-3.

18 McGrath, *op.cit.* (12), p. 42.

19 McGrath, *op.cit.* (12), p. 43.

20 McGrath, *op.cit.* (12), p. 167.

21 McGrath, *op.cit.* (12), p. 54.

22 McGrath, *op.cit.* (12), p. 154.

23 McGrath, A. *The Territories of Human Reason: Science and Theology in an Age of Multiple Rationalities*, Oxford: Oxford University Press (2018), pp. 13-14.

levels.'[24] Yet the elaboration on 'multiple rationalities' does not go without critical reflection over the course of this work. Rather, McGrath's concern for the (big) picture is the very point of reference to multiple concepts and applications of what is often likewise perceived as a somewhat more uniform sort of human reasoning, which shows – for instance – in the introduction, in which McGrath refers to Wittgenstein and his picture which holds us captive.[25] After assessing multiple rationalities in part one, McGrath turns to the critical evaluation. In the final chapter of this part he starts out with the focus on the big picture. Here, McGrath thinks of this as an appropriate ending for this work. He attempts to map out a framework within which human 'thoughts about the world' could be demonstrated as intertwined with human thoughts about 'value and purpose'.[26] Based on the evidence presented in his book, McGrath suggests thinking in terms of the principled colligation of 'little pictures', which in turn could create a larger picture, 'a seamless web of cross-relationships—perhaps to be visualized as a panorama, which connects and coordinates these snapshots.'[27] McGrath suggests three approaches for moving forward: We could respect diversity without even trying to resolve the tensions they show, we could settle on the smallest denominator, or we could set out for a meta-rationality. McGrath sees significant downsides to all of these approaches, showing some sympathy for the third and less for the first.

Natural Philosophy, fourthly, is a further contribution to that very conversation. Here, McGrath seeks to offer an exploration of what he perceives as a lost conceptual space. This concern leads to a reflection 'of the wider contemporary significance of this disciplinary imaginary and the possibility of its partial retrieval.'[28] In the past, McGrath argues, natural philosophy 'was seen to designate a coherent intellectual and cultural domain, which wove together what would now be considered to be quite distinct disciplines.'With this, he continues the quest he left off with *The Territories of Human Reason*, now asking how such a much-needed space can be retrieved for today? After engaging the writings of the past in part 1 and conceptualizing in part 2, McGrath hopes to 'recast a vision' of a way for retrieving some form of natural philosophy. For doing so, he offers an understanding of natural philosophy as a voluntary confederation of disciplinary territories. He claims that in this approach, all these disciplinary territories would keep their own interests and methods – but they would explore explicitly the greater question of 'how humans interact with the

24 McGrath, *op.cit.* (22), pp. 222-23.

25 McGrath, *op.cit.* (22), p. 5.

26 McGrath, *op.cit.* (22), p. 204.

27 McGrath, *op.cit.* (22), p. 205.

28 McGrath, *Natural Philosophy: On Retrieving a Lost Disciplinary Imaginary*, Oxford University Press (2022), p. 2.

natural world cognitively, affectively, aesthetically, and morally.'[29] For him, such an account of natural philosophy may lie rather in the subjective imagination: 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 the natural world that they disclose.[30] This expanded disciplinary imaginary of natural philosophy can help to shape informed attitudes toward the social order, for instance attentiveness towards nature for one, and proper respect for nature for another.[31]

Conclusion: Re-Imagining Wissenschaft via pictures and imagination

In a sense, McGrath has worked his way from a reconceptualization of natural theology to a reconceptualization of nature itself. While this latter reconceptualization is explicitly 'Christian' in its approach, his analysis of the preferred means of analyzing nature – reason – is reconceptualized from a 'both-and-approach'. By addressing, fourthly, natural philosophy, McGrath has moved towards a perspective that moves beyond the science and religion-binary. Now, if the 'big four' are the bricks, the 'minor four'[32] could be seen as the mortar: These publications are 'less academic' (as McGrath himself indicates in some cases), which is to say they are not aimed at professionals who are well aware of the related developments in science and theology, but rather to a broader readership.[33] However, it is here that McGrath reflects on his own journey so far, possible interconnections and uniting features. Although space does not permit a more detailed interaction at this point, it is noteworthy that McGrath continues to reflect and conceptualize the idea of a 'big picture' derived via imagination, highlighting the aspects of sense-making and meaning in the process. At any rate, and by way of conclusion, we can briefly synthesize essential aspects of McGrath's development of thinking in pictures and imagination.

McGrath never gives a once and for all definition of pictures. It is clear, though, that he refers to them as interchangeable with theories.[34] There are 'larger' and 'smaller' theories,[35] there are bigger and smaller pictures. A big picture, then, is addressed as 'a way of seeing things which aims to frame and hold together the

29 McGrath, *op.cit.* (27), p. 169.

30 McGrath, *op.cit.* (22), p. 177.

31 McGrath, *op.cit.* (22), pp. 177-82.

32 See footnote (6).

33 McGrath, *Enriching Our Vision of Reality: Theology and the Natural Sciences in Dialogue*, West Conshohocken: Templeton Foundation Press (2017), Preface.

34 McGrath, *op.cit.* (32), Chapter 5.

35 McGrath, *op.cit.* (12), pp. 177-8.

elements of our experience and observation.'[36] McGrath repeatedly credits human being's longing for a coherent whole as the motivation for integrating various aspects, rather than thinking of various facts and thoughts as independent phenomena. By entertaining big pictures, humans can connect things together 'in a web of meaning what might otherwise seem incoherent and pointless.'[37] The best theory is the one that is able to fit in observations and experiences most elegantly, most simply, most comprehensively, and most fruitfully.[38] While there is more that could be said about pictures per se in McGrath, the most pressing question is how these pictures are being developed. Here, McGrath proposes an approach in which larger pictures are being created via principled colligation of little pictures.[39]

For the development of such picture, McGrath points to imagination, a focus he receives from C.S. Lewis.[40] The reference to an imaginarium pays tribute to McGrath's concern that science is very good at taking things to pieces: 'Yet analysis is not enough; we need to weave together the various elements of our world in order to perceive the big picture.'[41] While the quest of how to apply imagination in the process of science, it is this approach McGrath is developing that seems to be a viable answer to the more general quest for Wissenschaft that is so vital not only the academy, but also for both the public square *and* the church – McGrath's path via pictures and imagination seems to be a promising way for revisioning 'Wissenschaft'.

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36 McGrath, *op.cit.* (12), p. 25.

37 McGrath, *op.cit.* (12), p.120.

38 McGrath, *op.cit.* (12), pp. 177-8.

39 McGrath, *op.cit.* (22), p. 206. See also McGrath, *op cit* (32), Chapter 4..

40 McGrath, *op.cit.* (32).

41 McGrath, *op.cit.* (32), Chapter 1.

Reviews

Nicholas Spencer
Magisteria

London: One World, 2023. 476 pp. hb. £25.
ISBN 978-0-86154-461-5

Nicholas Spencer's new survey of the tangled history of science and religion is an enjoyable and commodious introduction to the field. He relates the stories of the seminal events well, based on recent scholarship and with footnotes referring to the primary sources. Rarely has the tragedy of Annie Darwin's death at the age of ten been more poignantly told, or so well contextualised within Charles Darwin's wider theological struggle. Elsewhere, Galileo's tribulations with the inquisition, the Wilberforce/Huxley debate and the Scopes Monkey Trial are all carefully picked apart to identify the issues actually at stake. Readers of Science and Christian Belief are doubtless familiar with much of this, but should still admire Spencer's lucid analysis as well as finding his retelling of the key events a useful orientation for students.

There's plenty more that's valuable: for example, a fine explanation of Newton's theology, an exposé of phrenology, and an entertaining discussion of the Soviet Union's institutional atheism. That said, while the scope of the book is certainly wide, it remains largely Eurocentric. There is a chapter about Islam near the start and a look at modern Islamic creationism, as well as a nod towards China when the Jesuits turn up, but precious little about Buddhism or Hinduism. Through most of the book, 'religion' means Christianity and 'science' means the modern western variety. I expect that Spencer would have liked to include more global coverage but was chaffing against the word limit set by his publishers. It is disappointing that space constraints prevented the inclusion of a comprehensive bibliography.

Spencer is inspired by the complexity thesis of John Hedley Brooke, to whom the book is dedicated. *Magisteria* demonstrates the validity of this thesis many times, showing that science and religion have enjoyed periods of concord and conflict, and more often a kind of creative tension. The conflict myth is efficiently disposed of in the introduction, while the rest of the book provides numerous demonstrations of how contingent the interactions between science and religion have been. Spencer shows that it has been almost as dangerous for religion to rope itself to scientific theories that happen to be current at the time as it has been to exert its authority to oppose them. The title of the book is obviously a nod towards Stephen Jay Gould's non-overlapping magisteria, the inadequacy of which Spencer also notes.

Spencer suggests that the two occasions when matters can get especially fraught are when there is a dispute over who has authority to adjudicate between science and religion and when the debate concerns what it means to be a human being. These sound like sensible sign posts, and they could have been invoked more often in the text that follows. For example, Spencer notes the sad case of Ota Benga, a Congolese pygmy caged with apes in New York's zoo in 1906. This could have been explicitly examined through both the lenses - what is a man and who gets to decide? These were difficult questions in the nineteenth century, with disputes on the question of common descent within the religious and scientific magisteria, as well as between them. Nor can we say such matters are of historical interest only. The row currently in the news - what is a woman and who gets to decide? - would have seemed as incomprehensible to a Victorian as phrenology seems to us.

Many fine scholars have followed the path beaten by John Hedley Brooke in the early 1990s and a considerable body of work has appeared in the intervening 30 years on the historical relationship between science and religion. Nicholas Spencer is to be congratulated for wrestling this material into a coherent account with wisdom and compassion. His book becomes the best introduction to the field, ideal for students and general readers, while even academic professionals will find much food for thought.

James Hannam is the author of The Globe: How the Earth Became Round (Reaktion, 2023)

Andrew Ter Ern Loke

The Origin of Humanity and Evolution: Science and Scripture in Conversation

London: t&tclark, 2022.189 pp. hb. £76.50.
ISBN 978-0-567-70635-5

One might hope that a new book on evolution and theology will contribute to an emerging scholarly Christian consensus. Loke, a theologian at Hong Kong Baptist University, covers a wealth of literature on evolution and theology—although he omits the consensus document of Lucas and co-authors [*S&CB* 28 (2016): 74]—and is a prolific author. He argues that there is no incompatibility between human evolution and the Bible, but (to my mind) not in a way that will advance consensus.

Loke rejects *concordism*, the attempt to dovetail scientific and biblical accounts of reality. He prefers a model of *conversation* between science and theology (15). But his efforts to allow that 'Adam' *could be* placed into physical anthropological schemes evinces essentially concordist presuppositions. Loke has sympathies with the postulate of *biblical inerrancy* in addressing the issues of human origins, leading him to deny that the Bible presupposes the science of the day (26-28). He acknowledges that we must be wary of the errancy of our interpretations (27), and that all reading involves interpretation (14). But is scriptural inerrancy meaningful when we always approach scripture via 'exegetical errancy'?

Regarding the interpretation of Genesis 1 (such as the seven 'days'), Loke argues rightly that the concern of the biblical authors was the revelatory and salvific acts of God, not scientific details (42). But he criticises Daniel Harlow for stating that the authors of Genesis adapted 'sequences, themes and motifs from pagan myths … to craft new stories with a decidedly different theology' (44). Gordon Wenham concurs with Harlow: these texts provide a 'major *theological* interpretation of traditional origin stories' (Wenham, *Exploring the OT: The Pentateuch*, 15). It is Israel's *theology*, revealed in sharp relief to that of Mesopotamia, that liberates humanity.

Turning to science, Loke defends the consensus age of the universe, against those who propound 'young earth' ideas or assert that the world could be created with the appearance of age (36). He summarises several notions of, and evidences for, biological evolution. He affirms the compatibility of evolution and creation (70-72)—with the proviso that we allow for God's 'interference' at key points (69). But how can God 'interfere' if God is the continual source of existence, order and fruitfulness? The core of the book considers human evolution and the question of Adam. The author appropriately emphasises new findings, a rapidly changing field, and uncertainties in hominin evolution.

Loke postulates a dualism of body and immaterial soul (107-110)—a surprise for those schooled by Donald Mackay and Malcolm Jeeves. He suggests that souls are transmitted through the gametes, which have 'soulish potentialities' (110). He describes the image of God (*imago*

Dei) as the unique *role* to which humans are called and the unique *capacities* underlying that role (98-99). Loke proposes that the first person to possess the *imago Dei* was Adam, created as such from creatures that were products of evolution (106). Adam's parents were anatomically *Homo sapiens* but not fully human (121). After the Fall, the *imago Dei* was transmitted through Adam's descendants by mating with *Homo sapiens* individuals that did not possess the *imago Dei*. This initially generated separate populations of image-bearing and non-imaging-bearing *Homo* (128, 150). The localised Flood destroyed the *imago Dei*-bearing group, except for Noah's offspring, who mated with non-*imago Dei* survivors of the flood to repopulate the earth (17-18, 130). As a result, all humans today possess the *imago Dei* and could have a common ancestor (Adam, Noah) even though they descended from a large population of anatomical *Homo* as indicated by population genetics (17, 95, 111-113; 155).

As we attend closely to the inspired Hebrew writers, should we not recognise that they had no concern for physical anthropology. They saw the humanity of their age as called to represent and serve God—without being concerned (*contra* Loke) as to when or how in history God ordained humans as the *imago Dei*. Whether Neanderthals share the *imago Dei* is known only to God, the One whose summons both defines that image and commissions image-bearers to compassionate care for anyone who is marginalised.

Loke's acceptance of mainstream evolutionary science is a welcome corrective to the apologetic catastrophe of evolution-denial. His close attention to Scripture is admirable, but I found the tone of this book to be relentlessly polemical. The author engages with creationists using their biblicist strategies, which do not take the reader closer to the glory of Israel's God. I am not convinced by his speculative thesis that, despite our evolutionary origins, we are all descended from a historical pair, Adam and Eve (who must have lived before Australia was peopled 50,000 years ago) from whom we inherited the *imago Dei*. Nevertheless, this book could have mediating roles to play in polarised (American?) contexts.

Graeme Finlay, Honorary Academic, University of Auckland, has authored *Genes, Genealogies and Phylogenies* (2013, paperback 2022), *Evolution and Eschatology* (2021) and *God's Gift of Science* (2022).

D. Gareth Jones

At The Margins: A Life in Biomedical Science, Faith, and Ethical Dilemmas

Eugene, Oregon: Resource Publications, 2022. 198 pp. pb. £21. ISBN 978-1666744712

The name of Gareth Jones will be well-known to many readers of this journal. He has had a distinguished academic career as Professor of Anatomy and Director of the Bioethics Centre at the University of Otago, New Zealand. At the same time he is a highly regarded author and commentator on controversial ethical issues at the interface of biomedical science and thoughtful Christian faith, playing this role for more than 40 years. He is a prolific writer with tens of books to his credit and numerous articles published in international scientific journals, including several in *Science and Christian Belief.*

His latest book, subtitled *A Life in Biomedical Science, Faith and Ethical Dilemmas*, provides a series of thoughtful reflections looking back over more than 40 years of ethical engagement. The book has chapters addressing the ethical dilemmas raised by the use of 'unclaimed bodies' for scientific research, and the skeletal remains of indigenous popula-

tions, the Covid pandemic and scientific disinformation perpetrated by various Christian groups, and issues raised by IVF and research on the human embryo. A recurring theme throughout this book is the painful reality that many of Gareth Jones' most strident critics have not been his secular colleagues in New Zealand but Christians from a conservative Evangelical background. He recounts a bruising episode concerning his book *Brave New People,* published in 1984, which led to a flow of critical letters and boycott threats aimed at the American publishers IVP. The book was withdrawn by the publisher although subsequently republished by another house. Many scientifically trained readers will resonate with Gareth Jones' understandable frustration at the level of scientific ignorance and simplistic ethical thinking which seems common amongst some evangelical groups.

Of all the controversial areas in which Gareth Jones has taken a public stance it is the theological and ethical status of the human embryo which is the most contested. He argues that the conservative theological position that 'life begins at conception' becomes in effect a 'faith versus science' issue, since it makes unacceptable all scientific research into normal and abnormal embryonic development, as well as the extremely common clinical procedures of IVF and pre-implantation genetic diagnosis. The author makes a clear distinction between the embryo (up to 8 weeks gestation) and the fetus (beyond 8 weeks). We should treat the embryo 'with respect' but destructive research is appropriate if it has a worthwhile scientific or humanitarian purpose. He argues that large quantities of spare embryos are being created in IVF procedures around the world and it is good Christian stewardship to use them for the good of humankind. On the other hand, the more mature fetus should only be aborted in unusual and severe cases.

Speaking personally, I have great respect for Gareth's costly integrity, courage and persistence in promoting and defending ethical positions that, whilst thoughtful and scientifically informed, are currently deeply unpopular in conservative Christian circles. Although I find myself in disagreement with his conclusions about embryo research, there is much to learn in this volume about Gareth's principled refusal to shy away from difficult questions and his preparedness to occupy some of the uncomfortable borderlands between biomedical science and biblical faith. The painful reality is that there is a deep fault-line between thoughtful and well-informed biblical Christian believers when it comes to the philosophical and theological status of the human embryo and developing human. Over the period of 40 years that this book covers, the fault-line appears, if anything, to have widened. So there is a continuing need for genuine dialogue and careful 'double-listening' in this area between scientific and theological specialists. If this book has the effect of encouraging that dialogue it will have made a valuable contribution.

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Michael Ruse. Alister E. McGrath, Bruce L. Gordon

Three Views on Christianity and Science

Grand Rapids, Michigan: Zondervan Academic, 2021. 214 pp. pb. $18.99. ISBN 978-0-310-59854-1

This book has a logical structure characteristic of the Zondervan Counterpoints series on the Bible and Theology: each of the three protagonists is given the opportunity to lay out his view of the relation-

ship between science and Christianity, to which the other two provide responses, and then the original protagonist writes a rejoinder. The book has an introduction by Christopher Reese and a conclusion by Paul Copan, making a total of fourteen sections, which is certainly a thorough way to make sure each writer has their say. However, including the expression of three views, rather than two, means that it is not clear what conclusions should be drawn, and whether any one view is vindicated over the others.

The three views expounded are the Independence view, by Michael Ruse, who is not a Christian believer and considers belief to be a matter of faith rather than reason, but is positive about the contribution Christianity makes to society; the Dialogue view, by Alister McGrath, who holds that the two books of nature and scripture have equal importance but different concerns and can critique each other; and a Constrained Integration view, by Bruce Gordon, who is a proponent of Intelligent Design and considers that science should include concepts of divine design in its methodology and nomenclature, and that scientific law is dependent on divine action.

Readers of *Science and Christian Belief* may consider they would identify most closely with McGrath's view, and it was somewhat bemusing to be told by an unbeliever that Christian faith could have no basis in reason. McGrath employs academic terms; Gordon uses Cartesian philosophy to argue for the necessity of the existence of a God and quantum mechanics to argue that regular mechanical "law-like" laws are divine in origin. Ruse's style is the most informal and engaging: he expresses appreciation for McGrath's considered and intellectual approach, while professing himself unable to take the step of faith. While Ruse is emphatic in his rejection of Gordon's arguments for the necessary existence of God, he does not engage with those arguments in any detail, but simply states that he does not feel compelled to believe in God on the philosophical grounds Gordon provides.

In the introduction and conclusion, the editors adopt a conciliatory tone in relation to the debate between the protagonists and pose some interesting questions. They do not attempt to reach a reasoned conclusion, however, nor do they comment on how divine design could be studied scientifically; and the implications for the kingdom of God of defining Christian faith as purely irrational are not explored. Rather, it seems that the purpose of presenting these views is to show that the Christian church contains differing views of science and Christianity which can sit amicably alongside each other, without reaching a conclusion as to which view is preferable, or exploring the consequences of each view for science or Christianity.

This topic is undoubtedly of continued interest, and a future study could seek views from scientists who share the Dialogue view but differ as to how scriptural authority and scientific authority might interact with each other, for instance in relation to ethics, apologetics, or personal and political morality. It would also be good to hear more from female voices and perspectives from non-Western cultures.

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Alisha N Mack and Charles C Camosy

Bioethics for Nurses: A Christian Moral Vision

Grand Rapids, Michigan: William B Eerdmans, 2022. 242 pp. pb. US$ 21.99. ISBN 978-0-8028-7892-2

The authors set out to accomplish exactly what is indicated by the title – a book on bioethical issues for Christian nurses. Any reader, who is not a nurse, will gain valuable insights into the roles, contributions and frustrations of nurses, particularly those who are Christians. Both authors have strong backgrounds in nursing as well as in bioethics. Alisha Mack describes herself as an evangelical Protestant while Charles Camosy is described as a Catholic Christian. Initially I found the preponderance of references to Roman Catholic authorities unnerving, especially when Roman Catholic tradition is slated as one of the grounds of a Christian vision. The authors acknowledge there are differences in some of their approaches, although these do not distract from the dominant biblically based messages that come through.

Since both authors are American, there is a distinct American flavour to the book, especially when touching (briefly) on medical political issues and the health service. Nevertheless, there is a great deal of wisdom and helpful insights to be gleaned for those practising far away from an American context. A very helpful feature of the book is the generous use of case studies, some of which pose profoundly disturbing ethical dilemmas. The authors make no attempt to present spuriously simplistic answers, grounding their bioethical analyses in real (nursing) life.

The chapter on 'A Christian vision for nursing bioethics' is an exemplar in how to use Scripture to determine theologically based principles for nurses working with patients. The end-result is a set of seven key principles, with the reiterated reminder that, like the Good Samaritan, we are to put aside our selfish interests. Rather, we are 'to see the profound, inestimable value of human life, even when it is injured, sick, fragile, or weak,' and are to totally reject the throwaway culture that surrounds us (65). One manifestation of this is what the authors term 'accompaniment.' Christian nurses are to 'bind up the wounds of patients, and in the spirit of mercy to be physically close to patients in their illness, keeping vigil so they do not suffer loneliness in their final days and hours' (63). The conservative stance of the authors emerges in their emphasis on never being involved in killing at any stage of the life cycle. The challenges raised by such a stance are never downplayed.

The seven principles are returned to in subsequent chapters, touching on being made equal in the divine image; from fertilization to natural death; accepting death and never killing; and a superb chapter on Matthew 25 and human-created distinctions. Some of these chapters cover familiar territory, and yet they remain grounded in real life by the case studies around which they are structured. The authors are prepared to accept that compromise may sometimes be inevitable especially when resources are lacking. They reject an ableist vision as being radically opposed to a Christian vision with its favouring fundamental human dignity and equality even in the face of physical and mental 'deficiencies.'

In dealing with early development, their discussion becomes more theoretical, and it is very clear where their protectionist sympathies lie. And yet they strive to be consistent and practical, even though there are instances where the contribution of nurses will be limited in practice. Similar tensions show through when arguing against killing in a clinical setting. Here the authors use a thoroughly challenging case, that of Dr William Husel. A nurse challenged him over the high levels of Fentanyl he was giving to a patient in an ICU. Its repercussions for her and others were far-reaching, revolving around the doctor's intentions – to sedate or kill. Many other clinical decisions have similar reverberations, as do many

outside bioethics, such as in warfare. The authors merely touch on these, a wise decision since they extend beyond the core concerns of the nursing environment.

What shines through is that authentic Christian life is counter-cultural, resisting consumerism and ableism, nationalism that privileges citizens over non-citizens, classism that privileges the successful over the 'takers' and those who have been incarcerated. The relevance of this thinking is then applied to nursing and the availability of resources and medical technology, medical prestige, and above all to being oriented toward serving the least and non-citizens. They also decry our individualism and the longing to be radically free agents, since these are inconsistent with 'a Christian vision of the inherent relationality at the heart of human nature' (141). This leads them to comment that 'nurses care for actual people in the fullness of their human reality . . . . this summonses nurses out of themselves and into a relationship with their (often very vulnerable) patients' (142).

In returning to general themes, the authors touch on the place of conscientious protection for nurses within the broad framework of freedom of speech, and nurses rightful place in health-care teams. It is impossible to completely get away from COVID-19 and the authors face some of the horrific situations encountered by nurses as they attempted to uphold the full humanity of dying patients in situations characterized by pressures well beyond anything for which they had been prepared.

The major value of this book is that it espouses Christian bioethical approaches that, by facing up to the dilemmas of real life, go beyond the theoretical.

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David W. Opderbeck

The End of the Law? Law, Theology, and Neuroscience

Eugene, OR: Cascade Books, 2021. 248 pp. pb. £23.38. ISBN 978-1498223898

Being neither a lawyer nor a neuroscientist I approach this review from the perspective of an interested non-expert. Opderbeck addresses the intersection of law and neuroscience, so-called neurolaw, a new and developing area of the legal thinking. Essentially, the issue is whether the developments in neuroscience should change how people are treated with respect to the law. For example, could a fMRI brain scan be used to determine whether someone is lying in court? The controversial aspect of neurolaw is with respect to the area of responsibility: *mens rea* (Latin: guilty mind) the intention or knowledge of wrongdoing that is part of the crime committed. Can neuroscience, through fMRI brain scans, determine whether someone should be held accountable, and so punished, for the crime they committed, or in some way absolve them of criminal responsibility because their brains are wired that way. The latter is a deterministic perspective popular these days where free will is seen an illusion. This goes beyond the standard questions of diminished responsibility or insanity with regard to guilt for a criminal act as it sees all of us as having no choice with regard to our actions.

Opderbeck's book covers a lot of ground, not only law and neuroscience, but the links between theology and science, anthropology and paleo-law, philosophy and theology, and it is not possible to adequately cover all these aspects in this review. The book began life as a doctoral thesis, and this shows to some extent in the style of writing.

The longest chapter is that on Method in Theology and Science (Ch. 5) and I do wonder whether this discussion is necessary in this book. It covers familiar ground for those interested in science and Christian faith issues, but I am not sure what it adds to Opderbeck's arguments regarding the inadequacy of the neurolaw approach to the law, other than point out the limitations of reductive approaches in science generally, and so in neuroscience specifically.

The two most interesting chapters are Towards a Philosophical Critique of Neurolaw (Ch. 6) and Mind, Law, Theology (Ch. 7). Chapter 6 considers various critiques of neurobiological determinism, such as those by Stephen Morse a law professor at the University of Pennsylvania (unfortunately the references to his work seem to have been omitted from the bibliography). Opderbeck ends up with the classical conclusion that, 'If consciousness is an illusion, then nothing at all is right or wrong, and anything goes.' (154) This, of course, undermines any attempt to seek justice in society, and to live by the rule of law.

In Chapter 7 Opderpeck argues for a neo-Aristotelian account of human persons and this, together with a discussion of the work of four contemporary philosophical theologians in Chapter 8 (The Soul of the Law), allows him to move towards a synthesis of neo-Aristotelianism and theology with regard to understanding the basis for law. He concludes that, 'our neurobiology *enables*, but does not *determine* human actions.' (202) This preserves the idea we are responsible for our actions in the eyes of the law (and, of course, in the eyes of God too).

I enjoyed reading the book while finding some of it quite challenging being, as noted above, neither an expert in law nor in neuroscience. Nevertheless, I did learn much about this topic from the book and found it fascinating. One thing that I had not considered before is that only humans among all Earth's creatures formulate laws (5) and this, in part, is what makes us distinctively human. The main thing that I took away from the book is that western society and its laws, which were largely based on a belief in a transcendent God, are moving away from that basis and towards a view of people which sees them as possessing no free will and therefore having no responsibilities for their actions. It is difficult to see what justice means in such a setting, and this is clearly at odds with the Christian view that God is a god of justice who hold us responsible for our actions.

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April Maskiewicz Cordero, Douglas Estes, Telford Work

What About Evolution? A biologist, pastor, and theologian answer your questions

Eugene, Oregon: Cascade Books, 2022. 106 pp. pb. £18. ISBN 978-1-6667-1294-0

This three-chapter volume is truly collaborative and, as far as I am aware, unique in its approach. Each author's contribution contains footnotes where the other two authors make comments, including clarifications, caveats and diverging views. I found this format extremely helpful in seeing the dialogue between the disciplines of biology, biblical studies and theology, as well as exposing levels of nuance that are usually hidden in other multi author volumes. This topic in particular lends itself to this approach, as it exposes the breadth and diversity of views that are held by Christians – even those from very similar traditions.

This is an ideal book to give to conservative evangelicals who have concerns or questions about creation and evolution. The writing style is very accessible, but with a reasonable level of academic detail. The authors are all Professors at US-based Christian colleges (Point Loma Nazarene University, Tabor College and Westmont College, respectively). They are clearly very experienced in taking undergraduate students through the process of encountering evolutionary biology and discovering how it can integrate with deeply held Christian faith.

The authors clearly communicate their high regard for both Scripture and the fundamental doctrines of the Church. They also do the important work of sharing their own faith and struggles on this topic. Cordero also shares her own, and her students', experience of the wonder of science and how it helps faith to grow. The questions covered are ones that in my experience are often asked by this audience, and are fundamentally important for both science and Christian faith. The explanations are clearly well rehearsed, with practical examples, figures and analogies. There are of course a couple of points where I disagree with the authors, but that is unavoidable on this topic, and not enough (in my humble opinion) to spoil an excellent book.

I particularly appreciated Estes' distinction between science (as practiced by scientists) and 'science' (an ideological, scientistic, position), and likewise evolution and 'evolution', Bible and 'Bible'. Like all the authors in this volume, he affirms traditional Christian faith while also calling for us to engage in the daunting task of unlearning things we know incorrectly.

I was impressed at the combination of sensitivity and authority that each writer shows. They do not try to convert the reader to their own view, but instead make a good case for it, encouraging further honest and open exploration. This approach is ideal for the target audience, and particularly for young people. The one point all the authors express very strongly is that people should not feel they have to choose between Christian faith and evolutionary biology. My main complaint is that this short book is so expensive. It would be ideal for students, or to sell at church-based events, and hopefully will be available at a more reasonable price in future.

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Justin L. Barrett with Pamela Ebstyne King

Thriving with Stone Age Minds: Evolutionary Psychology, Christian Faith, and the Quest for Human Flourishing

Downers Grove, IL: IVP Academic, 2021. 160 pp. pb. $20.00. ISBN 978-0-8308-5293-2

The topic of human thriving has received attention recently in the context of positive psychology's search for the conditions that promote well-being and flourishing, particularly in a contemporary North American setting. This book explores human thriving from a dual perspective: evolutionary psychology—focusing on the commonalities of human experience across time and across cultures, and Christian theology—focusing on character, virtue, and purpose in life.

The authors are well-suited for this task, with both having a long-standing interest in the science-faith relationship and the conditions for human flourishing. Barrett brings special expertise in cognitive science of religion and evolutionary psychology, while King has a background in human development. Although the book's ideas and narrative text flow from a collaboration between the two authors (with input from several additional col-

leagues), Barrett as the primary author frequently uses first-person singular pronouns—a style that I found distracting.

The main audience for the book appears to be educated Christians who are uncomfortable with (and perhaps skeptical of) the idea of human evolution. For this audience, the book serves as an introduction to evolutionary psychology and evolutionary explanations for the behavior of contemporary humans. As described in the Introduction, the goal of the book is to demonstrate that 'evolutionary psychology and neighboring scientific disciplines can serve as useful tools in analyzing the challenges to human thriving' while still affirming that 'the Bible, properly interpreted, reveals critical truths about human nature and purpose and what it means to live a life worth living.' (x)

The book attempts to provide a framework in which 'Christian theology and scientific inquiry concerning human thriving can be brought together.' (xii) Ideally, the benefits from this dialogue should flow in both directions, thus strengthening the explanatory power of evolutionary theory by infusing it with theological insights about human purpose and what it means to live a good life. In practice, the bulk of the book's content points in the other direction, 'placing evolutionary psychology in the service of theology.' (10) Only in the final section (Chapters 7 and 8) does the book delve deep into relevant insights from theological anthropology, including the implications of humans as *imago Dei* (created in God's image) and the concept of *telos* as the purpose toward which a meaningful life should be directed. For readers who are already familiar with evolutionary theory, this portion of book may well prove the most useful.

Other readers may find the central portion of the book (Chapters 3–6) more interesting. This section first lays out a Christian understanding of evolution, namely that 'God created a cosmos with living things that gradually change over time to suit the demands of their environments,' and then defines human thriving from an evolutionary perspective as 'fine-tuning our natural capacities to fit our particular niche'—the specific environmental conditions or context in which we live. (26–27) This leads to the basic premise of the book (reflected in the title): Human thriving is threatened by a 'nature–niche gap'— that is, our physical and social environment (our 'niche') has changed so quickly and so dramatically that our 'stone-age mind' (our 'nature' formed during many thousands of years in hunter-gatherer societies) has not been able to keep up. (47)

In general, the physical and social environments for other animals such as squirrels and sparrows have changed less dramatically. In trying to understand the unique challenges for human flourishing, the book devotes considerable attention to human distinctiveness and the evolutionary development of three distinctive human capacities: an intense focus on social relationships, a deep desire to gather and use information, and conscious, intentional self-control. Apparently, human thriving requires each of us to move toward our individualized *telos* in a way that both employs and satisfies these three characteristics.

Although the evidence for these three distinctive human capacities is derived from research in evolutionary psychology, the book ties them to *imago Dei* and the generalized *telos* common to all humans: 'These three groups of features make humans the only animals alive today that can image God by exercising His reign over the rest of creation and, most importantly, the only animals that can truly and deeply love God and love each other.' (8) This is a good example of why, in my opinion, the book is successful in

arguing that evolutionary psychology is not necessarily incompatible with Christianity, but instead holds insights that may enrich a Christian understanding of human nature and human flourishing.

The last section of the book is a brief chapter-by-chapter study guide containing questions for individual reflection or group discussion, which will be helpful if the book is used in a college class or a book discussion group.

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Calvin Mercer and Tracy J Trothen

Religion and the Technological Future: An Introduction to Biohacking, Artificial Intelligence and Transhumanism

Cham, Switzerland: Palgrave MacMillan/ Springer, 2021. 266 pp. pb. US$ 44.99.
ISBN 978-3-030-62358-6

The aim of this book, described throughout as a textbook, is to assess and analyse the immense possibilities opened up by major technological developments for the future of the human body. What makes it stand apart from many other such books is that the authors bring a religious perspective to bear on the topic, repeatedly asking how religious insights can and should influence thinking and how religious traditions will probably be transformed.

The subject matter of the book is nothing if not daunting. The overall framework is that of transhumanism and radical human bioenhancement, with the focus placed on superlongevity, cognitive and moral bioenhancement, and even spiritual enhancement. Special topics touch on cryonics, mind uploading and digital immortality, and superintelligence. These topics will undoubtedly sound arcane to those with little background or interest in the extravagances of transhumanism. And yet the authors unpack them with skill and a deep understanding of the issues at stake. While appearing to have sympathy with many of the developments under consideration, their realism shines through as they repeatedly question whether the science will work out as suggested, and as they point to the way humans all-too-often abuse technological advances.

These cautions stem from the religious standpoints of the authors, Calvin Mercer being a professor of religion, and Tracy Trothen a professor of ethics. Both are heavily involved in study of human enhancement, transhumanism, and artificial intelligence. From this basis, their aim is to inform people at large about the nature of the changes that are occurring and how these changes will, in their view, intersect with religion. Although they have all religions in mind, their emphasis is on Christianity since the bulk of the writing undertaken to date has been by those within a Christian milieu.

They commence the book with a drastic statement: 'The religions of the world will come to an end, or thrive, depending on how they respond to the topic of this book' (3). They want their readers to appreciate that there is a new world coming, and that it is coming much quicker than most people realize. This is undoubtedly true, and their presupposition is that this will be brought about by 'biohacking', that is, the radical enhancement of human beings with therapies and technologies currently available or shortly to become so.

The authors are not neutral observers of the debate, although they strive to set out the issues as fairly as they can. Towards the end of the book, they state their position, namely, 'that religions can thrive, but only if they skilfully and creatively respond to the impending biohacked world . . . and contribute power-

fully and positively to humanity's general response to enhancement, making sure the technologies develop on the side of justice, freedom, religious integrity and community' (216-217). In other words, this is a call for theologians to take these technologies seriously, a call that I appreciate. A problem I foresee is that some of the claims being made by advocates of transhumanism are, for most people, extreme and intensely speculative. This becomes even more pressing when reference is made to TechPlus Theology, where theology is viewed through the lens of enhancement technology.

The authors take religious approaches to bioenhancement very seriously, and always seek to discern how those with a conservative stance or with a liberal stance will respond. At first sight this division appears simplistic, and yet it works out more productively than I had thought. The authors have a very good knowledge of the thinking of these groupings within the church, and their aim is to see how they are likely to respond to forms of radical bioenhancement. In practice, it seems there may be substantial overlap between the respective responses.

When assessing each example of enhancement, the authors first give a description of the nature of the enhancement before turning to religious issues and finally ethical issues. For instance, when dealing with cognitive and moral bio enhancement, their description includes smart drugs, brain biohacking, and the likelihood of morality being delivered in a pill. The religious issues include assessment of the relevance of the Tower of Babel motif, while ethical issues include consideration of the therapy-enhancement continuum, the place of choice and the role of justice. The authors are helpfully prepared to guide readers as to where they come down in these debates.

The textbook description is apt, since the book covers a great deal of ground, and there is much to be learned from it. Not all the procedures are extreme, even if they are set within an extreme paradigm. Several of them are already in existence, and readers are gently reminded that many of us are cyborgs in the sense that we walk around with artificial joints and pacemakers. It also comes as a challenge to those on the conservative side of theology to ascertain how much they are prepared for their traditional interpretations to be extended. The book is extensively referenced, and the authors are very well versed in Christian theological stances.

The more general value of the book is to stimulate Christians and others to reflect theologically and ethically on technological developments, most of which are far less threatening than the ones discussed in this book, and yet with profound consequences for thinking about God and his relationship to the world.

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John Wyatt and Stephen N. Williams (Editors), Justin Welby (Forward)

The Robot Will See You Now: Artificial Intelligence and The Christian Faith

SPCK, 2021, 251 pp, pb £12.70, ISBN 978-0-281-08435-7

'Artificial intelligence (AI) is in the air that we breathe.', so say editors John Wyatt and Stephen N. Williams in the opening sentence of their Editorial Introduction. They are quite right. We are living in unprecedented times where AI in some form is found almost ubiquitously wherever one looks. At a time when we all need to play 'catch-up' with wherever

technology is seemingly heading, this work shines as a much-needed social, ethical, and theological Christian perspective on robotics and AI.

In fact, this book arrives at an extraordinarily well-timed moment, when AI has, yet again, become the focus of popular debate and discussion in the media, some of it informed, but much of it less so. This collection of 14 articles arose from a recent international research study based at the Faraday Institute in Cambridge, co-led by one of the editors, John Wyatt. Written by the participants, the articles deal with a whole host of broadly social, ethical and theological issues, opening as it does with a perceptive forward from the Archbishop of Canterbury, Justin Welby. Despite the study's academic roots, the editors have clearly taken great care to curate a collection of articles which are both well-written and accessible for a general, non-expert, lay audience.

Although published in 2021, well before the likes of OpenAI's ChatGPT and Google's Bard emerged from the lab, Wyatt and Williams have wisely steered well clear of expecting readers to have any specific knowledge or indeed, any experience of this fast-changing technology stream. The technology-agnostic approach adopted herein ensures that readers need not be overly distracted by technology concerns as such. All that readers need to take away is that AI is real, it exists and will surely impact how we live, whoever we are.

For readers who need further reassurance about what AI is about, there is a short, non-technical introductory article supplying sufficient reference and context to grasp the essentials of what AI technology is (and is not) about. Additionally, this also briefly outlines some of the relevant history and some of the broader concerns, including the following: 'AI is simply the display by a machine of any cognitive process that we would expect to be done by a person.'

Each of the 14 articles is grouped under one of three parts; the first of which is called **What is going on? Cultural and Historical Analysis**. The articles there explore how our culture has *already* responded to the AI question, certainly in the form of popular science-fiction films and novels, as well as in general philosophical terms, discussing notions such as simulacra and simulation. The second part is called **Theological Frameworks And Responses**, dealing with issues of a more foundational philosophical and theological concern such as the nature of personhood, of human flourishing and exploring how the emergence of AI challenges the nature of what humanity is. The third part is called **Ethical and Social Issues**, and addresses many of the contact points of AI with modern society - how will AI affect human well-being, the nature of work, the impact of AI on health and social care, and artistic creation in music and painting. The final chapter talks about AI and 'surveillance capitalism', the very active 'data mining' of our behaviour for the benefit of corporations and governments.

From a Christian point of view, the content is positioned in an ecumenically neutral manner, admirably eschewing doctrinal biases as far as I could see – it is conceivably accessible and useful for even a non-Christian, secular audience. It also focuses on issues of what AI is, compared to humanity, confronting head-on what it means to be human. Emphasis is commonly placed on AIs *simulating* behaviour that might normally be ascribed to people. Modern AIs are determined by their training regime and are therefore incapable of acting with an independent *conscience*, neither morally nor immorally – judgement is clinical. AIs behave *neutrally* in a chillingly amoral manner; given any goal, an AI pursues it relent-

lessly, whatever it is.

Overall, this collection offers many valuable, timely insights into the social, ethical and theological issues concerning AI and is essential reading for thoughtful Christian engagement with AI.

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Sandra J. Godde

Reaching for Immortality: Can science cheat death?

Eugene, Oregon: Wipf and Stock, 2022, 81pp. pb £14.40 ISBN 978-1-6667-3674-8

Godde's brief but broad book, addressing the growing phenomenon of transhumanist thinking, seeks to equip 'Christians to examine and respond to the transhuman agenda regarding death and immortality, considering technological advances and biblical visions of the future' (xii). Her attempt at this is noble. The scope of transhumanism's appeal and outreach to the world in popular culture, academia and public debate has grown exponentially in the past decade as scientific development has stepped closer to science fiction. The need for a book like this is timely and well met.

Godde has divided her work successfully into short, easily digestible chapters which are highly accessible to the lay person and succinctly set out the challenges to the Christian faith. She contrasts the transhumanist vision with 'God's dream for humanity: for us to be immortalized in Him' (xiv). She allows this contrast to be demonstrated in each chapter. The table is set early on for each, differing focus given to the challenge of transhumanism when she notes that 'While the posthuman agenda seeks to immortalise the mind by cheating death, the gospel offers something more than a promise of future, embodied immortality' (7) The book continues by setting each challenge in turn and comparing it to the Christian promise.

Drawing on technological developments in AI (such as Neuralink) and biotechnology (CRISPR-Cas9) she emphasises that 'our future entails possibilities where technology will blur the distinction between our individual persons and machines' (4) which will raise serious ethical challenges. I commend Godde's ability to lay out the environment so well in such a short book, but for those whose appetite is whet, every chapter would need a much deeper dive to explore the issues raised. Only a surface introduction can be given, but this book does a brilliant job at doing so.

The book flows from an examination of pop-culture to technology and academic voices, but throughout successfully keeps the voices of the key players in transhumanism heard. For a brief introduction, it succeeds in familiarising the lay person with the drivers of the movement, both past and present. Godde asks whether 'technology of this scope, scale…potentially be another nail in the coffin of true, embodied humanity?' (18) before going on to argue from Christian tradition that the body 'should be dignified, not sought to be eradicated or superseded' (19)

She explains that 'Transhumanism is a philosophical orientation towards 'technological solutionism' and is generally undergirded by a belief that radical technological progress will eventually disrupt society and redefine the very definition of the human being' (20) She helps us by introducing terms like *singularity* and *omega point theory*, mapping out the three prongs of biological, bionic, and virtual immortality clearly for anyone to grasp. When you follow the book, you can draw easy parallels to where you may have seen or heard these ideas in everyday life. As the creeds and doctrines of transhumanism are laid out, so is the un-

derlying philosophy that 'this cybernetic evolution of our species depends upon the premise that life is identified with information alone.' (23) Here we find many more broadly familiar ideas from reductionism and materialism married to their technological outworking. In a vein not far removed from New Atheism, we see Daniel Dennett's ideas that humans are essentially minds, which are fundamentally information, therefore people are essentially algorithms and digital patterns. No free will exists, we are genetically determined, and equal rights are a Christian myth. Here religion is the enemy because it is unscientific, blind, offering comfort and acceptance of death.

Godde succeeds in exposing the transhumanist's blind belief in progress as both inevitable and good, without accounting for human freedom or moral character. She writes that 'human nature cannot be changed by the augmentation of intelligence' (39) and I was reminded of Richard Feyman's signoff to the Space Shuttle Challenger disaster report that ultimately nature cannot be fooled.

I did question whether all Christians would agree on perhaps transhumanism's more noble ambitions to improve the human condition of health and strength against disease and debilitation. Godde explains that to transhumanists 'our body is the main problem, imposing…intolerable restrictions' (32) and their vision that 'We must wage a technological and medical war against aging and death' (31) which is 'a moral responsibility.' (32) However, as a geneticist well familiar with CRISPR-Cas9, I was reminded of how Nobel laureate Jennifer Doudna has been very candid in explaining how her mind changed on the ethical possibilities of CRISPR. She raised repeatedly the question of when it is more ethical to act rather than not, when the power to alleviate suffering is in your hands. What if Christians end up being the voice of opposition to the practical healing potential of CRISPR, especially when it has already been successfully applied to sickle cell disease?

The book concludes with a concise outline of where the gospel succeeds at the pitfalls of transhumanism: 'An anthropology where the physical body is seen as inherently flawed does not add to a vision of future flourishing.' (66) The Gospel's glorious vision of hope in God's transformation of us is far grander than anything transhumanism has to offer, with its foreshadowing in Christ's resurrection a greater historical example than what science fiction can dream of.

With its strong introduction to the topic, this book is recommended for a lay person as well as for a philosopher. I encourage those interested and disinterested to read it.

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Simon Conway Morris

From Extraterrestrials to Animal Minds: Six myths of evolution

Templeton Press, 2022. 432 pp. hb. £28.37.
ISBN 978-1599475288

Simon Conway Morris' latest book is a collection of six inter-related essays on topics ranging from the emergence of evolutionary complexity to the Fermi Paradox. As expected, it is buttressed by an massive bibliography. I promised myself not to look at the bibliography at first, but found myself turning to it over and over again as one astonishing fact after another tumbled across the pages. I should add, as a sort of disclaimer, that I was a PhD student of Simon's, and even

back in that antediluvian era he was famous for poring endlessly over the literature, spending Saturday mornings in the quaintly-named Scientific Periodicals Library and seemingly transferring most of it into a vast card index. Thus, the text moves casually from the Great Molasses Flood to Yorkshire Terriers to Dyson Spheres, and the reader, almost helplessly, is drawn along as if lashed to a bamboo raft heading for some particularly dicey-looking rapids.

Despite the breadth of topics, some overarching themes emerge. The first is that evolution is simultaneously both more messy and yet more law-like than popularly imagined. It is messy in that it doesn't proceed along straight lines of 'missing links' leading straight from say, *Archaeopteryx* to pigeons but rather, some groups tend to repeatedly produce the raw materials of such transitions. Within the theropod dinosaurs, for example, bird-*like* groups evolved on multiple occasions, so that one is left with a sense that a bird as we would recognise it today was somehow bound eventually to appear. This incidentally touches on two live scientific topics, the idea of so-called 'deep homology', whereby a shared genetic apparatus can lead to the parallel appearance of similar morphological features in different lineages; and the whole problem of detecting convergence. Indeed, as Simon concedes, our ability to detect the patterns of evolution is clouded by our basic inability to know when particular features do and do not indicate common descent.

Another theme taken up is about evolutionary limits – have we reached them, or will evolution in the future simply meander away indefinitely? Simon argues that there are physical limits to functionality and that many have already been reached. His compelling discussion of sensory systems here is one of the most absorbing of the whole work, and this deep appreciation of the extraordinary outcomes of evolution (as exhibited in a previous work) was what led Richard Dawkins to astonish the internet by tweeting appreciatively about it. Of course, the limits we know of are set by conditions on Earth and here I perceive the distant influence of a wonderful book that Simon urged me to read when I was a student – *Life's Devices* by Steven Vogel (Princeton, 1988). What about on other planets then? In his final chapter, Simon turns to the Fermi Paradox – why no aliens? And if there *are* aliens, what are they like? Simon's answer to this is the obvious but (to many) unpalatable one.

The animal minds chapter runs strongly against the modern *Zeitgeist* that animals are basically just like humans, but without the worries of parking tickets or copy deadlines. Simon, following a rather Kantian or Wittgensteinian line (see e.g. §28 in *Kant's Analytic* by Jonathan Bennett (CUP, 1966)), argues that to be human is to possess a sort of complex framework of intellectual and conceptual abilities that make the question 'I wonder what it would be like to be an aardvark' a meaningless one: if one *were* such an organism, that sort of self-reflective thought would not be possible even in principle. I think this is right, and further reflection along these lines tends to thoroughly support Simon's contention about the vast and unbridgeable gap between our world and that of all other (known) life. One more example: at one point (240), Simon mentions how listening to *The Lark Ascending* instantly transports him to an ancient burial mound on the Dorset chalk highlands. Ah, I know exactly what he means, I thought as I read this – but no, my transport was to the West Kennett long barrow in *Wiltshire*, with its haunting history of a thousand years of reverence followed by sudden abandonment (for reasons why, Mann's *Avebury Cosmos* (Moon Books, 2011) offers some tantalising hints). It is exactly this human ability to depart from one emotive and suggestive point

to another, with their almost unbearably rich associations of history, place, culture and religion that must be entirely lacking in animals. Simon then hints about what might be the meaning of this new space humans have entered, and here one is quite clearly in the world of the Prologue to St John's gospel, entirely orthogonal to the ever-hopeful materialist insistence on 'emergence' from complex arrangements of matter. How many of the likely readership of this book will agree with him however remains, I think, to be seen.

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A. J. B. Hampton and D. Hedley editors

The Cambridge Companion to Christianity and the Environment

Cambridge UK: Cambridge University Press, 2022. 300 pp. hb. £69.99. ISBN 978-1108495011

This book is not quite what it says on the cover! The title suggests yet another compilation of essays on Christianity and the environment. There are plenty of those already, many written by a growing group of specialist eco-theologians (myself included I suppose), but this is quite different. Rather, it is a serious academic volume with a specific aim: to give a philosophical, historical and cultural analysis of the relationship between western Christianity and the natural world. It accepts the core proposition that our current ecological crisis arises largely from Western worldviews deeply influenced by Christianity. However, it problematises and complicates Lynn White's simplistic narrative (White, *Science*, 1967) that Western Christianity is entirely to blame, by demonstrating diverse and dissenting traditions and influences within Western Christianity.

The book is divided into three broad sections: 'Concepts', 'Histories' and 'Engagements'. 'Concepts' looks at issues around naturalism and supernaturalism from ancient to contemporary thinking, including an intriguing suggestion that Teilhard de Chardin's evolutionary approach to science and faith was prefigured in the Epicurean philosopher-poet, Lucretius. Charles Taliaferro, examining the possibility of nonhuman animals possessing souls or even consciousness, makes a crucial distinction between the *scientific naturalism* which leaves no room for explanations beyond the natural sciences and '*broad naturalism'* (49) which allows for insights from social science and spirituality. Robin Attfield's chapter on 'Anthropocentrism, Biocentrism, Stewardship and Co-creation' gives an excellent synopsis of critiques of the term 'stewardship' and follows Southgate in advocating a role for humans as 'co-creators and co-redeemers' (71-77).

The 'Histories' section has chapters examining environmental philosophies from Ancient Greece, the Mediaeval and Early Modern eras, the Protestant Reformation, Romanticism, and contemporary religious ecology. This demonstrates a more complex history within western environmental thinking than often surmised. For example, Greek philosophy was not simplistically dualist in separating spiritual and material, but also contained seeds of panpsychism and deep ecology in attributing 'soul' to all created entities. The later Christian Neoplatonism of the medieval era so idealised and personified nature as a source of divine wonders and lessons, that the later scientific revolution in seeking evidence-based knowledge swung the pendulum towards a total desacralization of nature. Bacon's and Descartes' mechanistic understanding of nature stood in stark contrast to discerning God's hand at work

although some, like John Ray, integrated scientific and theological understandings. Mark Stoll's chapter on 'Protestantism, Environmentalism and Limits to Growth' argues that whilst Protestantism may (*pace* Weber) have given impetus to early capitalism, it is largely Protestant cultures that underlie contemporary environmentalism. Puritan ideas of responsibility and modesty birthed later concepts of sustainable use of natural resources, and the environmentalism of Aldo Leopold and Rachel Carson owes no small debt to Christian understandings of nature as a community of which we are part (reflected today in the writings of Richard Bauckham and the Papal encyclical *Laudado Si'*.

The final section on 'Engagements' is very diverse, ranging from reflections on 'the sublime and wonder' as concepts encouraging humility before nature, to a detailed plea from Michael Northcott for 'conservation approaches which draw on indigenous and religious knowledge as well as natural science' (244), and a chapter by Jame Schaeffer on sacramental approaches to nature as providing a moral orientation fostering earth-care.

Overall, a brief review cannot do justice to a complex and important book such as this. Its one major weakness is that (with the exception of Northcott's chapter) it largely ignores insights from beyond Europe and North America. It is clear about that limitation, but if Christians are to recover approaches to nature that offer hope for a sustainable future, we need a wider and deeper debate including wisdom from the global Church.

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Christopher Knight

Eastern Orthodoxy and the Science-Theology Dialogue

Cambridge University Press: Cambridge UK, 2022. 82 pp. pb. £15. ISBN 978-1009107761

In the background of a vast literature on science-theology dialogue, Christopher Knight, an astrophysicist and Orthodox priest, attempts to outline the ways in which Eastern Orthodox theology can contribute to such a dialogue. The book is not easy to read because it requires a substantial insight into Orthodox theology, as well as good knowledge of hot scientific issues, which challenge traditional theology.

Knight, in spite of claiming a distinctive specificity of Orthodoxy in its relationship to the sciences, positions discussion in the context which was historically set up outside the Orthodox tradition. He uses the classification of the relationship between science and theology, suggested by Ian Barbour, in terms of *conflict, independence, dialogue and integration*. After reading the book one is left with an impression that Orthodox theology cannot follow any of these options. The only option is to treat science and theology as two mutually *complimentary* modi of humanity's activities. Then, one agrees with Knight that the Orthodox tradition offers some 'alternative' pan-Christian vision of the dialogue with the sciences 'providing ways of looking at particular issues that may offer new and important insights' (5).

The author starts with the topic of natural theology. He comes to the point that Orthodox theology with its patristic scope can propose not to build a systematic natural theology, but to bypass it through introducing into its scope a *noetic*, non-descriptive element. Indeed, one can contemplate nature and God's presence on a personal or inter-personal level. Yet, such a contemplation lies outside the scope of the scientific approach to nature. It can contribute to some non-descriptive hermeneutics of nature, but not to the assessment of modern sciences

as prescriptive for the physical existence.

In the next issue related to the languages used in science and theology, the author compares the use of critical realism in science and theology (17-19). Knight appeals to the Orthodox distinction between apophatic and cataphatic ways of theologising in order to compare the former with critical realism. However, such a comparison seems to be overstretched because critical realism in science deals with the phenomenality of objects whereas theology deals with the inaugural events which are initiated 'from beyond space and time.' A conclusion is possible that the languages of science and theology are different but complementary as originating in one and the same man.

Then section 3, devoted to the 'Mind-Body problem' can be qualified as anthropological dealing with the problem of consciousness. Modern neuroscience, research in artificial intelligence, cognitive psychology, all struggle with a fundamental problem of consciousness as specific phenomena, which correlate with the physical states of the brain. The nature of this correlation remains unclear. Theology can only provide its empirical interpretation. In no way it is capable of advancing any specific description of the psychosomatic unity of man apart from referring to a special act of creation. It seems then that no specific Orthodox insight on the issue, understood scientifically, can be drawn.

The next section 4 discusses the issue of panentheism, that is, the stance on the presence of God in the world as well as of the world's 'place' in God. Knight lists several theological writers on panentheism. Then he considers examples of the seemingly teleological tendencies in modern sciences which 'confirm' panentheism. However, such a move is not convincing because the inference to the philosophical creator must be supplemented by the Christological element. Another problem is that any teleology manifests a propensity of the human intelligence to imply purposiveness of everything in order to know it. If Knight justifies panentheism through a teleological insight, this panentheism turns out to be anthropologically inherent.

The next section 5 on *Divine Action* develops a point on how to articulate the Divine presence in specific terms. Knight invokes Maximus the Confessor, as well as other thinkers along the lines of what he calls 'evolutionary Christology' (46). Then he makes a smooth transition to the section *Naturalism and the 'Miraculous'*, where the Divine action is considered through the distinction between laws of nature and 'paranormal' or miraculous phenomena. This distinction necessitates a phenomenological stratification of encounters with the Divine actions which is abundant in patristic sources. Since natural laws and miraculous events manifest themselves in different phenomenalities, no straightforward hierarchy of them is possible.

And finally comes section 7 *An Eschatologically Focused and Trinitarian Understanding* starting its discussion from how to understand nature in the perspective of the Biblically understood Fall. Orthodoxy insists that the Fall has consequences not only to human nature, but to nature at large. However, the prelapsarian, paradise-like state of humanity and nature can hardly be conceived in terms of the sciences functioning in the post-lapsarian condition. If one promotes an idea that the whole universe was in a non-physical state before the Fall, one comes to the contradiction with the Incarnation of God in the post-lapsarian flesh of Jesus of Nazareth whose possibility is linked to the evolution of the universe. Here one agrees with Knight, who refers to Maximus the Confessor, that the Fall accompanies creation of the world,

so that any actual prelapsarian existence is hypothetical and the Fall-narrative points to a spiritual nostalgia for the intellectually invoked Paradise (55). Indeed, such an Orthodox stance on the Fall is distinctive and logically consistent with the modern scientific view of reality.

In conclusion, the book generates many questions. Scientific advance challenges theology by showing that some of its concepts must be updated in modern terms in order to be comprehensible and existentially relevant. This was not the objective of this book, but this is the conclusion after reading it. Unfortunately, the book omits the theology of John Zizioulas, who was the only one able not only to advance Orthodox theology but also to criticise it in the light of scientific developments. One also notes that the choice of particular philosophical means of mediation (analytic philosophy, for example) between science and theology is not justified and not appraised in the background of other existing approaches in the continental thought.

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Lamoureux Denis O.

Beyond the Evolution vs. Science Debate

McGahan 2021. 130 pp. pb. £10.4.9 ISBN 978-1-951252-11-3

Professor Lamoureux has written a book that is very accessible for a teenage audience while at the same time covering all his points in a serious way. The main theme is that there are not only the two options normally assumed on origins – i.e. evolution or creation. While he sides very clearly with the evolutionary creation view, he makes it clear that this is entirely up to each reader to decide for themselves and that there are good serious Christians holding any of the three options he cites – (1) young earth creation, (2) progressive creation and (3) evolutionary creation as well as combinations of these. He deals with deistic evolution and atheistic evolution as well, stressing that these are not options for a Christian belief. Lamoureux spends considerable time speaking about intelligent design and presents this in a loose way – i.e. that God has specific purpose in His creation and while it may have taken billions of years, He designed it to work as a self-assembling enterprise. He does not deal with the 'Intelligent Design' lobby that would agree that God designed everything but with a tendency to reject evolution as being part of that design as they regard it as anti-creationist. His book contains considerable detail on cosmology and biology demonstrating that none of the current scientific theories (and I am glad he defined what a theory really is rather than the commonly assumed definition of it as an unproved hypothesis) are contrary to a biblical account. He includes many helpful diagrams to illustrate his points, pointing out very clearly that the science in the Bible is ancient science that would have been meaningful to an audience of the time, rather than modern science. He stresses that this is how God communicates with His people and that the Bible is not about providing answers to modern scientific questions.

I found myself agreeing with him on virtually every point even though the processes he went through to reach his present position are somewhat different to my own. I am not sure that I entirely agree with him that the 'days' of Genesis 1 were originally understood as 24-hour days, but he may well be right. He still points out that it was dealing with ancient understandings of creation and that the purpose of the passage is to stress that God is responsible for the whole of

creation; not to inform us about scientific processes. He shows that the chapter is poetic in its nature, and, to me, poetry is often not meant to be taken literally, but I may not properly understand ancient poetry!

My assessment is that this is a very useful book to use for teenagers who are keen to understand these issues and, in my experience as a science teacher, a large number of teenagers really want to know and understand more about this perceived debate. I would have no hesitation in recommending it for use in schools and for any young person struggling in any way to make sense of how God relates to the creation and modern science.

Neil Laing is a retired secondary science teacher and author of *'Is God Really Legit?'*

Joseph R. Laracy

Theology and Science in the Thought of Ian Barbour: A Thomistic Evaluation for the Catholic Doctrine of Creation

New York: Peter Lang, 2021. 326 pp. £58.52. ISBN 9781433190056

Professor Joseph R. Laracy offers an in-depth and insightful contribution to the relationship between faith and science in this ecumenical work. His research, likely to be of interest to many evangelical Christians, provides an analysis on how Ian Barbour's thought can contribute to and enrich the Catholic understanding of the interaction between natural science and the doctrine of creation. Laracy's book elucidates the seminal contributions of Ian Barbour, a gifted physicist and Protestant theologian. Laracy examines what Catholic theology can learn from Barbour's approach, which has also appropriated certain aspects of process philosophy.

This book is divided into five chapters that develop from Barbour's life and works to various approaches for the interaction of theology and science. In the end, Laracy proposes paths of integration for the doctrine of creation and natural science. Throughout these chapters, he touches upon apposite topics such as various typologies of interaction for theology and science, origins of the critique of knowledge, Barbour's implementation of Whiteheadian philosophical principles, Thomistic realism and metaphysics, natural theology, and more.

Laracy analyses the personal, philosophical, and theological influences that played a substantial role in the development of Barbour's approach. He highlights Barbour's dissatisfaction regarding the prevailing opinion that the only modality of interaction between Christian theology and the natural sciences was one of conflict. For Barbour, the highest degree of interaction between theology and science is possible when a systematic synthesis is achieved through an inclusive metaphysical system.

The book considers similarities and differences between theology and science according to Barbour from the perspective of scientific materialism, fundamentalism, neo-orthodoxy, existentialist philosophy, and linguistic analysis. In his process perspective, Barbour emphasizes the primacy of time, the interconnection of events, reality as an organic process, and the self-creation of every entity. Barbour believes that 'becoming' is more significant than 'being' because 'transition and activity are more fundamental than permanence and substance' (101). Barbour's study of science and theology acknowledges the importance of communities and their paradigms.

Laracy carefully examines Barbour's epistemological, metaphysical, and theological principles. We see the points of contact as well as discontinuity between Barbour's and Stanley L. Jaki's thought.

In addition, Laracy explores where and how Barbour's approach can facilitate dialogue and integration between Biblical revelation and the natural sciences. He utilizes Barbour's dialogue typology to explore presuppositions and limit questions in science related to the intelligibility of the universe, its contingent existence, its boundary conditions, the contingency of laws, and the contingency of events. Laracy also investigates methodological and conceptual parallels between theology and science. The book concludes with a discussion about how natural theology, a theology of nature, and a systematic philosophical synthesis of the two fields can realize Barbour's typology of integration.

Laracy's book left me wondering how Barbour's Barthian approach to the analogy of being aligns with his attempt to take a non-reductionistic perspective. On the positive side, despite the fact that Barbour tries to create a novel notion of continuous creation without creation from nothing as traditionally understood, Christians can appreciate Barbour's efforts trying to build his theology of nature upon the doctrines of creation, Divine providence, and human nature. Laracy's account of Barbour's thought is helpful and enlightening as he succinctly captures both his most important contributions and aspects that may still need further evaluation. Laracy underscores Barbour's positive view on the interaction between theology and science, based on methodological parallels, as well as Barbour's principles which are congruent with the Thomistic notions of form and the hierarchy of being.

Importantly, Laracy also points to Barbour's disagreements with traditional Christian theology. He critically engages Barbour when Barbour allows his process metaphysics to 'overwhelm' Biblical revelation. The book is substantial contribution to furthering the interaction of theology and science. It makes clear how creation is utterly dependent on God and all beings participate in God's infinite *esse*. This monograph will certainly be of interest to students and researchers in the theology-science field, evangelical and Catholic alike.

Ricardo Lozano Cruz is a seminarian of the Diocese of Camden, New Jersey, USA.

Peter J. Bellini

The Cerulean Soul: A relational theology of depression

Baylor University Press, 2021. 212pp. hb. £39.50. ISBN 978-1-4813-1093-2

As Bellini's book identifies, depression is the leading cause of disability worldwide in terms of total years lost due to disability and therefore seems a very worthy topic for thorough academic discussion. Science has never located a biological agent directly causing depression. To quote Bellini, 'The various theories of depression – biochemical, psychological, cultural often reflect one's philosophical anthropology. How one defines the human person is telling in how one defines mental disorder'.

This very deep and profound book argues that if we understand the triune God to be essentially relational at the core of His heart then this will shape our understanding of what it is to be human and therefore underpin the relational nature of depression as we understand ourselves to be theological spiritual creatures, made in the image of God for relationship with Him. Bellini explains that 'despondency serves as a biosocial and spiritual marker for our human weakness, brokenness, and spiritual struggle for meaning and wholeness. Further it is a call to grow, to be restored' and this through 'redemption and transformation, given freely in Christ through the healing and sanctifying power of the Holy Spirit'.

He also emphasizes that union with the risen Christ should not be misconstrued as oppressively reinforcing of ableism, and that salvation 'gives new form to all persons, whether "abled" or "disabled".

This very dense book, which reads more like a research thesis, could I think be fairly described as a highly scholarly work which intentionally belongs to the world of serious academia, with an inherent beauty and coherent gravitas that I warmed to as I was making progress through it. It is, however, a work which, in its current format, is probably just not accessible to most people as a sufficiently digestible book to be able simply to pick up and read through. I read through the first third of this book whilst on a one-way five and a half hours plane journey, and I went on to regret not having the freedom then at high altitude to look up words (as, to be honest, even with my reasonably good breadth of English vocabulary, and me being a qualified medical doctor with an undergraduate degree from Oxford University to my name!) I was somewhat floundering with the vocabulary being beyond my comprehension several times a page, particularly with Bellini's assumption that his readership would be comfortably conversant with Greek and Latin. Very extensively referenced, readers would benefit from a summary of the key findings alongside this publication.

Bellini's theological understanding is typically aligned with my own and therefore the theology was for me reassuringly very familiar, coherent, and understood; a rich theology that clearly came across as consistent with the reformed protestant biblically faithful tradition. It goes into such depth as a study of the nature of God including God's capacity for deep suffering and compassion that there is then a natural flow towards studying the nature of depression as part of human life experience. Mental illness can be more broadly inferred from this book to be the result of the breakdown of relationships either with ourselves, with others, with Creation, or with the Creator. An alienation and estrangement from God's blessing, mixed with our own depravity, can only predispose us to melancholia. The dizzy uncertainties of apparent freedom when there is unlimited choice without God's boundaries upon our psyche, can only predispose us as human beings to feel overwhelmed and anxious. As Bellini goes on to say, 'God's peace transcends the temporal relief we seek from depressive symptoms', stabilizing and consoling us amidst chaos and calamity with the Christian community's promised blessings of a cultural worldview understanding the need for forgiveness, radical hospitality, and justice. Rather than simply cure, Christianity points towards the Christ-centered shalom of healing and wholeness. As the Lord promises to ultimately bring meaning from suffering, to bring good from our brokenness, He promises to abide with His people forever, 'I will never leave you nor forsake you' (Hebrews 13:5).

Angharad Gray works as an NHS community psychiatrist in England and she volunteers as both the CMF Psychiatry Link person and a pastoral care worker for the Christian Medical Fellowship (CMF).

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(www.scienceandchristianbelief.org)

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Science and Christian Belief

The Journal of
Christians in Science and
The Victoria Institute

Volume 35 (2) 89-206 October 2023

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ISSN 2756-0988 S&CB 35 (2) 89-206 (2023)