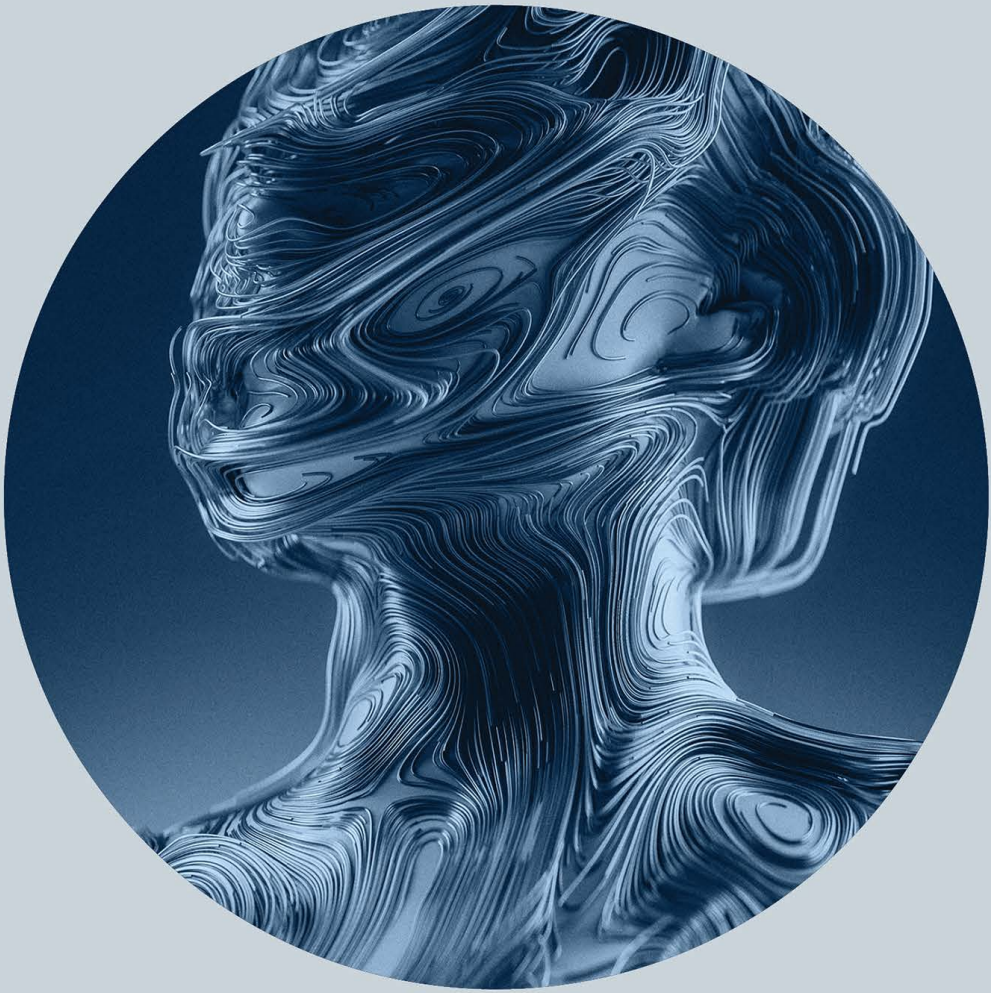
CPOSAT

Christian Perspectives on Science and Technology



ISCAST

The ISCAST Journal
New Series, Volume 2, 2023

Christian Perspectives on Science and Technology

The ISCAST Journal

For submissions: editor@iscast.org
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Christian Perspectives on Science and Technology

The ISCAST Journal

ISSN 2653-648X (Online)
ISSN 2653-7656 (Print)

https://journal.iscast.org/
New Series, 2, 2023

About the Journal

The ISCAST journal, *Christian Perspectives on Science and Technology* (*CPOSAT*), was relaunched in 2022. Capitalising on the previous years of publication (online since 2006; its rich archive is available on the ISCAST website), the journal is now a world-standard academic resource.

The ISCAST journal is unique in the Australian landscape and one of the few journals globally that discusses the nexus of science, technology, faith, ethics, and spirituality. In doing so, it advances ISCAST's mission of promoting a climate of mutual understanding and constructive exchange between science and technology practitioners, and people of faith.

The target readership includes academics interested in science and faith, as well as educators, church leaders, and postgraduate and graduate students.

The relaunched journal is an online, open-access resource, inviting original contributions from national and international scholars. It publishes book reviews and double-blind peer-reviewed articles. The accepted articles and book reviews are published as they become available. At the closing of each annual edition, the published materials are collected in one document, also made available via the journal's website. This document corresponds to the journal's printed release.

We invite articles in science/technology that have theological/ethical/spiritual implications, and articles in theology/ethics/spirituality that engage scientific/technological topics. Original studies of the history of science and faith are equally welcome. While the authors retain the copyright for their respective works, the materials published in *CPOSAT* may be freely disseminated, with due acknowledgment of their authorship and the place of original publication.

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CPOSAT is indexed with the National Library of Australia, ATLA, Finnish Publication Forum, and CrossRef.
https://doi.org/10.58913/isxa

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Editorial

At the close of the second volume of ISCAST's academic journal, *Christian Perspectives on Science and Technology*, we give thanks for the way things have proceeded so far.

Earlier this year, we launched the first volume (2022) by way of an online event attended by people from around the world (4 May 2023), the video recording of which being available on ISCAST's YouTube channel. The authors whose articles were published in the inaugural volume offered brief comments about their research, as well as their experience with our editorial team. We were gratified by their encouraging feedback.

An overwhelming number of articles had been submitted throughout this year, of which nine were accepted for publication after peer review. The published contributions hail from Australia (two), Canada (one), New Zealand (three), and the United States of America (three). The articles address a range of topics, from evolutionary biology and pastoral studies to psychoanalysis and the history of faith and science. While the authors worked independently, their articles complement each other wonderfully, mapping wide areas of the complex landscape of Christian faith and science. As such, they align to ISCAST's mission of fostering intelligent discussion and presenting sound information pertinent to the field.

Graeme Finlay's two articles provide evidence for the evolutionary processes that had taken place for millions of years and still unfold behind the scenes of human and nonhuman life, highlighting the importance of grasping these processes for the assessment of our own existence and destiny. It is against the backdrop of our evolutionary past and present that God's purpose for us comes to light, pointing towards the glory to which we are called, despite humanity's humble beginnings and current condition. A related idea transpires through Carolyn King's article about Christian systems of education that marginalise scientific information. For believers to understand human na-

ture in the parameters of contemporary culture, scientific literacy is as important as the use of hermeneutical principles. Equipped both scientifically and in terms of their faith, Christian students will be able to overcome the deeply counterproductive confusion caused by the either/or model. Alan Dickin's contribution addresses a related matter, namely, the misrepresentation of the Genesis narrative of creation, which scientifically minded people and believers often misread. The solution boils down to discerning between scientific account and "true myth" (to paraphrase C. S. Lewis), which frees Genesis of expectations it cannot meet and allows for its proper interpretation.

James Ungureanu joins the conversation from another angle, by dismantling the oft-referenced sources of the "conflict thesis," Draper and White. The contributions of the two scholars have long been misunderstood and misquoted, as they still are, to this day. But before he reaches this point, Ungureanu undertakes a solid critique of Nicholas Spencer's recent book on *magisteria*, with which he both agrees and disagrees. His approach is historical and informative. Relevant here is that, as with the previous ones, his article proves that sound information deepens one's understanding of the relationship between faith and the contemporary sciences. In the same vein, Danielle Terceiro's contribution debunks contemporary secular myths about Maria Sybilla Merian, a pioneer of modern entomology whose undertakings at the crossing of art and science were doubled by Calvinistic commitments. Contrary to recent reconstructions of her biography, whereas Merian was indeed a courageous trailblazer for scientific research, her rebellion against received views did not include her faith. This group of historical analyses is rounded up by Jacob Chengwei Feng's article on the history of Assyrian Christian missions to China at the end of Late Antiquity and in the early Middle Ages. Faced with the Chinese techno-scientific civilisation, the missionaries of the Assyrian Church of the East had to engage their contemporary culture. This led to meaningful intersections between faith and the sciences, a success whose lessons could inspire current undertakings.

Two other contributions, of an applied nature, complete this issue's repertoire. One, by Antonios Kaldas, reviews an edited volume on Orthodox Christianity and psychoanalysis. This is an informative summary and critique of recent undertakings within the framework of the project "Science and Orthodoxy around the World" (Athens, Greece), amounting to a different assessment of psychoanalysis from the usual Western approaches. The other contribution, by Armand Babakhanian, explores the potential of historical Western Christian traditions for addressing technological addiction. The practical dimension of this line of research cannot be overstated, which taps into the applicability of familiar yet insufficiently understood aspects of the Christian experience.

These peer reviewed articles are followed by fourteen book reviews, curated by our colleague, David Hooker, which present to the reader a range of relevant publications from across the spectrum.

We cannot conclude this overview of the volume without expressing our heartfelt gratitude to the advisory board members, the peer reviewers, the proofreaders, and our indefatigable colleague, Jackie Liu, who has produced the items for the website through the year, as well as the complete document of *CPOSAT*'s 2023 issue, which you are now reading.

Last but not least, we are profoundly grateful to ARTFinc for its gracious support of the journal's development via a grant (2023–2024).

Doru Costache
Mark Worthing

December 2023

Note from the ISCAST Executive Director

Once again, it is a great pleasure to add my word of thanks to the editors (as well as the host of other contributors) for bringing together this second volume of the relaunched ISCAST journal. Thank you Doru, Mark, and Dave and all your helpers for your part in contributing to the ISCAST mission of engaging people in constructive conversations between the sciences, technology, and the historic Christian faith.

It is also my pleasure to announce that three prizes were awarded for the best articles published in *CPOSAT* in 2023; we are very grateful to the panel members who decided on the winners. Congratulations to Jacob Chengwei Feng, Danielle Terceiro, and James Ungureanu for winning this edition's prizes. This year two prizes have again been provided by the Australian Research Theology Foundation Inc., and one by the generosity of an anonymous donor. This third prize is in memory of the late Prof. John White, who was a pillar of ISCAST and the science–faith conversation in Australia. An obituary to John can be found on the ISCAST website.

May this journal continue to play its part as it witnesses to the beautiful harmony between the Gospel of Jesus Christ and the products of science and technology, as they reveal the hand of the Creator and put that knowledge to good use for the wellbeing of both people and the rest of the creation.

Chris Mulherin
ISCAST Executive Director

Being and Becoming: The Complementarity of Creation and Evolution

Graeme Finlay

Abstract: Longstanding debates relating to biological evolution concern whether random events (mutations of DNA) are able to generate new functionality, and whether such proposed evolutionary mechanisms are compatible with belief in divine creation. The sequencing of genomes from multiple species has generated a flood of genomic data, so that genetic changes may be correlated with species' phenotypes. Our genomes are modified by mutagenic agents such as retroviruses (ERVs) and transposable elements (TEs). Empirical data confirm that random accumulations of ERVs and TEs in the human genome have rewired regulatory networks in early embryos (ERV-like MaLR elements), embryonic stem cells (ERV-H), and primordial germ cells (ERV-K). Altered regulation of gene activity in neural cells has been evinced for a class of TEs called SVA elements. Random, stochastic events in the context of natural laws that are hospitable to life may indeed generate new genetic information. Christians may see such phenomena as aspects of a freely operating and fruitful creation. Acceptance of biological evolution and the role of randomness in an anthropic cosmos are indeed compatible with the biblical concept of creation—that the whole system is ordained, ordered, and sustained by a purposeful and self-revealing God.

Keywords: creation; evolution; gift of existence; humanness; randomness

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Graeme Finlay is retired from teaching scientific pathology at the University of Auckland and is a lay preacher. He has written *Human Evolution* (Cambridge University Press, 2013), *The Gospel According to Dawkins* (Austin-Macauley, 2017), *Evolution and Eschatology* (Wipf and Stock, 2021), and *God's Gift of Science* (Wipf and Stock, 2022). He is married to Jean, a musician, and they have two adult offspring.

Of longstanding interest to biology is the question of whether random mutations are able to generate new forms and functions during evolution. This issue has been likened to the question of whether myriad monkeys pecking away randomly at typewriters for a very long time could generate the works of Shakespeare. Or whether a tornado in a junk yard might assemble a Boeing 707.

The development of comparative genomics can now provide empirical results that throw light on this question. The genomes of thousands of species have been sequenced. Genome sequences from different species can be aligned with each other to identify mutations that have appeared in particular taxa of organisms (reflecting particular stages of evolution). Increasingly, mutations can be related to a species' phenotype to indicate whether random genetic changes can underlie the development of regulatory networks, integrated functions, and complex structures.

For many people who are interested in the question of a creator, these considerations seem to provide the possibility of an answer. It might be thought that if random mutations can account for new features in biological evolution, then a creator is no longer necessary. This paper reviews recent evidence that random mutations—featuring insertions of viral sequences and of transposable elements into genomic DNA—do indeed generate features peculiar to human biology. Random events certainly underlie the acquisition of characteristic features of *Homo sapiens*.[1]

But these discoveries cannot address the question of a creator. Randomness alone can generate nothing; it requires the context of a lawful anthropic cosmos—that is, a universe with the potential to sus-

1 For other fascinating examples of novel features, see my *Human Evolution: Genes, Genealogies and Phylogenies* (Cambridge: Cambridge University Press, 2013) and *Evolution and Eschatology* (Eugene, OR: Wipf and Stock, 2021). Retroviruses and transposable element insertions are only one class of mutation that has formed our genome. But I have focused on these agents because each event is essentially unique, the prior state and the derived mutated state in the genome are known, the enzyme-catalysed mechanisms by which they arise have been elucidated, the functional consequences of these mutagens are amenable to investigation, and (to my mind) they generate fascinating stories!

tain life such as ours. The fruitful interplay of free randomness and directing lawfulness underlies evolution. The question of a creator pertains to the very existence of such a world. We *accept by faith* the idea that this productive cosmos is divinely ordained. Or equally, we *reject by faith* the idea that this fecund cosmic structure comes from the mind of God. (By *faith*, I intend to indicate *commitment in the absence of absolute certainty.*) No scientific discovery can adjudicate between these alternatives. Those who perceive an incompatibility between biological evolution and theological creation are misinformed.

It follows that belief in God's creative activity does not pertain to individual events that are describable by science; but to the very existence of a cosmos in which free and lawful events can occur. Ultimately, of course, belief in a creator is based on personal communication—God's self-revelation—which Christians believe has occurred in Jesus.

Endogenous Retroviruses

We have discussed in a previous article[2] the fact that most of our genome is composed of randomly accumulated units of parasitic DNA. Endogenous retroviruses (ERVs) and transposable elements (TEs) are semi-autonomous genetic elements that randomly colonise (and so modify) the genomes of (probably) all organisms. (My focus on evolutionary relationships between humans and other placental mammals—for which ERVs and TEs provide unambiguous phylogenetic markers—means that I will not consider more distantly related organisms such as invertebrates or bacteria, or the mutagenic mechanisms that pertain to those organisms.) The way ERVs and TEs proliferate in genomes is stochastic—the time and location at which a new element will arise cannot be predicted—but repeatedly they have been recruited into providing new functions.

New elements arise in the genome as junk—as unsolicited accretions to the genome of a functioning organism—and some of them

2 See Graeme Finlay, "Evolution as History: Phylogenetics of Genomes and Manuscripts," *Christian Perspectives on Science and Technology*, New Series 1 (2022): 150–174, doi.org/10.58913/JJHH2131.

initiate genetic disease.[3] Disease-causing elements are pathogenic junk. But there is growing evidence that a proportion of ERV and TE insertions eventually acquire functions that serve the host organism. Units of DNA added randomly to genomes may transition from junk to valuable or even essential genetic componentry.

Some ERVs have contributed genes that function in the development of the placenta. ERV genes usually decay with time from insertion into animal genomes. But a small number retain protein-coding capacity, presumably because the viral protein contributes to the survival or reproductive success of the host animal. Of particular interest are retroviral *envelope* genes, that enable the viruses to adhere to cells during the process of infection. Some ERV *envelope* genes have been domesticated to specify the production of proteins (now called *syncytins*) that promote the formation of the syncytiotrophoblast, the lining of the placenta.[4] Another retroviral *envelope* protein has been transformed into a derivative (now called *suppressyn*) that may act to regulate or tone down excessive syncytin activity.[5] In addition, suppressyn prevents envelope protein on infectious retrovirus particles from adhering to placental cells. This domesticated retroviral protein acts to provide a defensive barrier that prevents invading retroviruses from docking on to cells.[6]

3 For example, the role of SVA elements in genetic disease is discussed in Abigail L. Pfaff, Lewis M. Singleton, and Sulev Kõks, "Mechanisms of Disease-Associated SINE-VNTR-Alus," *Experimental Biology and Medicine* 247 (2022): 756–764, DOI: 10.1177/15353702221082612.

4 For reviews, see R. Michael Roberts, Toshihiko Ezashi, Laura C. Schultz et al., "Syncytins Expressed in Human Placental Trophoblast," *Placenta* 113 (2021): 8–14, DOI: 10.1016/j.placenta.2021.01.006; Kazuhiko Imakawa, Kazuya Kusama, Tomoko Kaneko-Ishino et al., "Endogenous Retroviruses and Placental Evolution, Development, and Diversity," *Cells* 11 (2022): 2458, DOI: 10.3390/cells11152458.

5 The gene encoding suppressyn resides on chromosome 21, which in Down's syndrome is present in an extra copy. Excessive production of suppressyn because of trisomy 21 may cause placental abnormalities in Down's pregnancies by inhibiting cell-cell fusion and syncytiotrophoblast formation. See Jun Sugimoto, Danny J. Schust, Tomomi Yamazaki, and Yoshiki Kudo, "Involvement of the HERV-Derived Cell-Fusion Inhibitor, Suppressyn, in the Fusion Defects Characteristic of the Trisomy 21 Placenta," *Scientific Reports* 12 (2022): 10552, DOI: 10.1038/s41598-022-14104-1.

6 John A. Frank, Manvendra Singh, Harrison B. Cullen et al., "Evolution and Antiviral Activity of a Human Protein of Retroviral Origin," *Science* 378 (2022):

Part of a retrovirus *pol* gene has been transmogrified into a gene (*NYNRIN*) that contributes to the invasion of placental trophoblast cells into the uterus.[7]

ERVs have been coopted into roles which rewire or reconfigure genomic control circuits. Such reorganisation may include the specification of the body plan early in embryonic development.[8] Three classes of ERV will be considered below. They appear to exert regulatory influences in stem cells during early phases of ontogeny.

MaLR elements are ERV-like entities that colonised the genomes of (now extinct) primates from which monkeys and apes are descended. Many such MaLR elements in our genome become active very early in embryonic development: at the four-cell and eight-cell stage of our personal histories. They provide binding sites for a protein called DUX4 that is a master regulator of genetic expression. (In humans, but not macaques, some of these MaLR elements are active also in the adult pineal gland and bind the OTX2 protein to regulate other genes.)[9] Randomly accumulated retroviral DNA segments have been recruited to orchestrate our primordial genetic programme.

It has been known for some time that members of a class of ERV (ERV-H) are genetically active—they are copied or transcribed into RNA molecules—in pluripotent embryonic stem cells.[10] Such ERVs are believed to be involved in maintaining stem cell pluripotency. Re-

422–428, DOI: 10.1126/science.abq7871.

7 Arnon Plianchaisuk, Kazuya Kusama, Kiyoko Kato et al., "Origination of LTR Retroelement-Derived NYNRIN Coincides with Therian Placental Emergence," *Molecular Biology and Evolution* 39 (2022): msac176, DOI: 10.1093/molbev/msac176.

8 For a review, see Anna D. Senft and Todd S. Macfarlan, "Transposable Elements Shape the Evolution of Mammalian Development," *Nature Reviews Genetics* 22 (2021): 691–711, DOI: 10.1038/s41576-021-00385-1.

9 Sanna Vuoristo, Shruti Bhagat, Christel Hyden-Granskog et al., "DUX4 is a Multifunctional Factor Priming Human Embryonic Genome Activation," *iScience* 25 (2022): 104137, DOI: 10.1016/j.isci.2022.104137; Kosuke Hashimoto, Eeva-Mari Jouhilahti, Virpi Tohonen et al., "Embryonic LTR Retrotransposons Supply Promoter Modules to Somatic Tissues," *Genome Research* 31 (2021): 1983–1993, DOI: 10.1101/gr.275354.121.

10 These are primitive cells found in the early embryo that have an unlimited ability to proliferate (given the right conditions) and the potential to produce all the specialised cell types of the mature organism.

cent findings have identified a particular subset of ERV-H sequences (LTR7up) that is responsible for the maintenance of pluripotent stem cells. What is common to these functional ERV sequences is that they possess a DNA sequence motif (ACAAAAGA) to which regulatory proteins (SOX2 and SOX3) can bind, and thereby activate nearby genes implicated in stem cell maintenance (as depicted, Figure 1).[11]

The insertion site of one of these ERV-H sequences is depicted in Figure 1. The viral sequences (in green font) start with CAGG… (on the left) and, hundreds of bases later, end with …GCATG on the right. This ERV-H is present at the identical genomic site in all the African great apes. That means that it arose in a unique event that occurred in an ancestor common to these four species. However, the ERV-H sequence is absent, and the target site undisturbed, in Asian apes, Old World monkeys, and New World monkeys. This potentially functional element arose in primate DNA by the standard random infectious mechanism.

A second subclass of endogenous retrovirus, ERV-K (subclass LTR5Hs), has been recruited into gene-regulating circuitry early in embryonic development. ERV-K inserts are genetically active—they are transcribed into RNA—in primitive pluripotent stem cells and also in *primordial germ cells*. The latter cells are a class of stem cell that are produced in the early embryo and that give rise to reproductive cells (eggs and sperm). Primordial germ cells are vital for fertility.[12]

11 Thomas A. Carter, Manvendra Singh, Gabrijela Dumbović et al., "Mosaic Cis-Regulatory Evolution Drives Transcriptional Partitioning of HERVH Endogenous Retrovirus in the Human Embryo," *eLife* 11 (2022): e76257, DOI: 10.7554/eLife.76257.

12 Xinyu Xiang, Yu Tao, Jonathan DiRusso et al., "Human Reproduction is Regulated by Retrotransposons Derived from Ancient Hominidae-Specific Viral Infections," *Nature Communications* 13 (2022): 463, DOI: 10.1038/s41467-022-28105-1; Jumpei Ito, Yasunari Seita, Shohei Kojima et al., "A Hominoid-Specific Endogenous Retrovirus may have Rewired the Gene Regulatory Network Shared between Primordial Germ cells and Naïve Pluripotent Cells," *PLoS Genetics* 18 (2022): e1009846, DOI: 10.1371/journal.pgen.1009846.

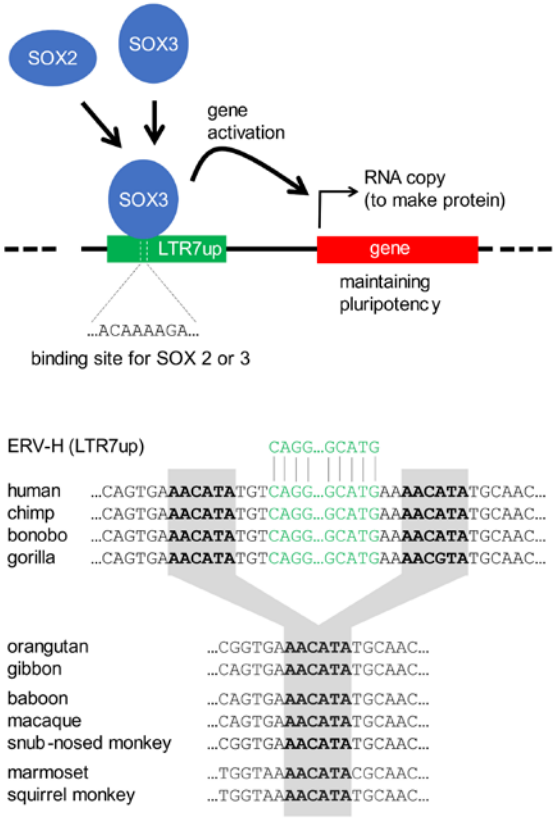

Figure 1. An ERV-H insert (subgroup LTR7up) activates genes in pluripotent stem cells

Above: a generalised scheme depicting an LTR7up insert (green box) in which a series of bases (...ACAAAAGA...) recruits proteins (SOX2 or SOX3) that activate a nearby gene (red box) with the function of sustaining pluripotency.

Below: an insertion site of an LTR7up element. The ERV sequence is depicted in green font; the target site (AACATA) and its duplications are in bold type and shaded. This insert was from ref. 11, https://elifesciences.org/articles/76257/figures#files, supplementary file 1, row 5. In this and following figures, sequences were recovered using the UCSC Genome Browser and the NCBI BLAST algorithm.

One particular integrant is found near the *FHAD1* gene and its exact point of insertion is depicted in Figure 2. As with Figure 1, the insertion event occurred in an African great ape ancestor, and the undisturbed pre-integration site is present in orangutan and gibbon, monkeys, prosimians, and even some non-primate mammals.

In humans, as pluripotent stem cells transform into primordial germ cells, ERV-H activity decreases and ERV-K activity increases. It is intriguing to consider that randomly accumulated ERV types coordinate the activities of differing genetic programmes as cells progress through sequential stages of development. Retroviruses long resident in our DNA control the early stages of our development as human beings and, according to the most recent evidence, they continue to do so as the body matures.[13]

13 ERVs and TEs continue to bind gene-regulatory proteins through later stages of development. LTR5Hs binds pluripotency-sustaining proteins (such as KLF4) in stem cells of early embryos, and cell lineage-specific regulatory proteins (such as SOX17, GATA6 and TBXT) in subsequent stages. See Julian Pontis, Cyril Pulver, Christopher J. Playfoot et al., "Primate-Specific Transposable Elements Shape Transcriptional Networks During Human Development," *Nature Communications* 13 (2022): 7178, DOI: 10.1038/s41467-022-34800-w. In the maternal part of the placenta (the uterine *decidua*), many classes of ERV and TE provide binding sites for gene-regulatory proteins more frequently than expected by chance, including 62.8% of the binding sites for the progesterone (pregnancy hormone) receptor. Many sites transform from gene-repressive to -enhancing depending on epigenetic controls. See Katelyn Mika and Vincent J. Lynch, "Transposable Elements Continuously Remodel the Regulatory Landscape, Transcriptome, and Function of Decidual Stromal Cells," *Genome Biology and Evolution* 14 (2022): evac164, DOI: 10.1093/gbe/evac164. At least one endogenous retrovirus of the ERV-K subclass is genetically active in each of fifty-four *adult* tissues as well. Whether such ERV-K activity is random noise or implies hitherto unsuspected functionality is not known. Aidan Burn, Farrah Roy, Michael Freeman, and John M. Coffin, "Widespread Expression of the Ancient HERV-K (HML-2) Provirus Group in Normal Human Tissues," *PLoS Biology* 20 (2022): e3001826, DOI: 10.1371/journal.pbio.3001826.

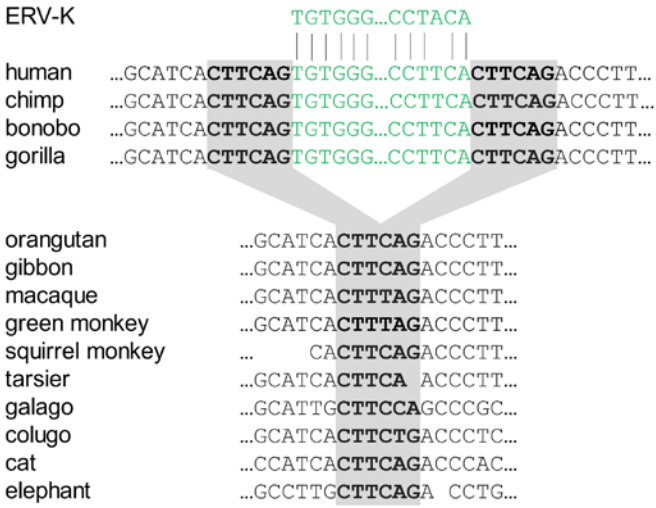

Figure 2. An ERV-K insert (subgroup LTR5Hs) participates in gene activation in primordial germ cells

This ERV-K insert is on chromosome 1, near to the *FHAD1* gene. Identified by Xiang et al. (2022), ref. 12.

Transposable Elements

Hundreds of types and subtypes of TE have colonised primate genomes. A class of TE known as SVA elements has arisen only in great apes, and features of their genetic sequence predispose them to participation in gene-regulating functions. Evidence suggests that a subset of SVA elements influences the function of nerve cells. One such element is located between two genes that specify the TRPV1 and TRPV3 proteins. These are ion channels responsive to heat and (in the case of TRPV1) to capsaicin, the pain-eliciting component of chilli peppers, and are also implicated in inflammatory responses. This SVA element appears to regulate the expression of TRPV3 (Figure 3). If the SVA element is deleted experimentally, the activity of the *TRPV3* gene is reduced.[14]

14 Emma Price, Olympia Gianfrancesco, Patrick Harrison et al., "CRISPR Deletion

The insertion site of this SVA element is shown in Figure 3. It was spliced into the DNA of a human ancestor after the human lineage separated from the chimp/bonobo lineage. The undisturbed target site is present in all other primate species and in the colugo (or flying lemur, a non-primate) and is perfectly preserved in all other apes. This is a human-specific SVA insert, arising in a discrete event in human history, and it will exert human-specific effects.

SVA elements may also drive gene expression in pluripotent stem cells (along with the ERV inserts described above).[15] When pluripotent stem cells become specialised as progenitor cells of the hippocampus (a brain region implicated in learning and memory), ERVs and SVA elements feature as open sites effecting gene regulation. In particular, human-specific SVA elements are associated with changes in gene expression in human relative to chimp cells.[16]

Apes are anomalous relative to other primates for their extended lifespan and increased body size. These features are correlated. A small cohort of SVA elements has been implicated in the regulation of genes that contribute to extended lifespan.[17]

Another characteristic of apes is that they lack a tail. During the development of most mammals, the formation of a tail is initiated by a gene-regulating protein known as brachyury (for which the gene symbol is *TBXT*). In various mammals, *TBXT* mutations are known to lead to abnormal tail structure.

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of a SVA Retrotransposon Demonstrates Function as a cis-Regulatory Element at the TRPV1/TRPV3 Intergenic Region," *International Journal of Molecular Sciences* 22 (2021): 1911, DOI: 10.3390/ijms22041911.

15 Samantha M. Barnada, Andrew Isopi, Daniela Tejada-Martinez et al., "Genomic Features Underlie the Co-option of SVA Transposons as Cis-Regulatory Elements in Human Pluripotent Stem Cells," *PLoS Genetics* 18 (2022): e1010225, DOI: 10.1371/journal.pgen.1010225.

16 Sruti Patoori, Samantha M. Barnada, Christopher Large et al., "Young Transposable Elements Rewired Gene Regulatory Networks in Human and Chimpanzee Hippocampal Intermediate Progenitors," *Development* 149 (2022): 200413, DOI: 10.1242/dev.200413.

17 Daniela Tejada-Martinez, Roberto A. Avelar, Inês Lopes et al., "Positive Selection and Enhancer Evolution Shaped Lifespan and Body Mass in Great Apes," *Molecular Biology and Evolution* 39 (2022): msab369, DOI: 10.1093/molbev/msab369.

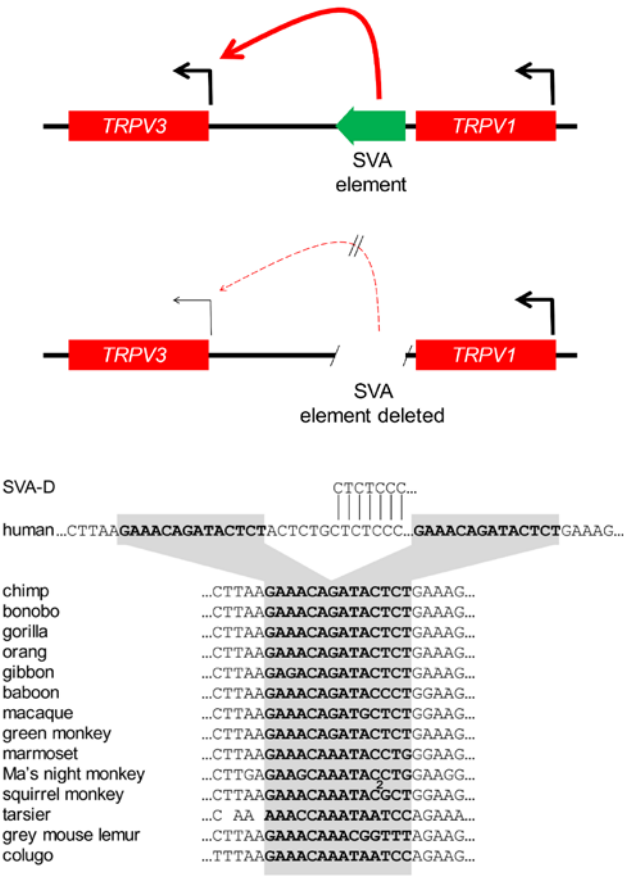

Figure 3. An SVA-D insert that regulates the TRPV3 gene involved in neural function

Above: The SVA element (green arrow) activates the TRPV3 gene. If the SVA element is deleted by an experimental procedure (genome editing), TRPV3 gene activity is suppressed.

Below: The SVA insertion event occurred since our last common ancestor with chimps.

SVA-D sequence is from the Dfam database. This insert was identified in Price et al. (2021), ref. 14.

In apes, two instances of a TE class known as Alu elements occur in the *TBXT* gene and may have played an initiating role in tail loss. One of these Alu elements has been present since a common ancestor of all the simian primates (monkeys and apes). It is located (blue arrow, Figure 4) between the fifth and sixth segments of the *TBXT* gene.

A second Alu element (red arrow, Figure 4) was added to the primate genome between *TBXT* segments six and seven in an ancestor of all the apes (including humans). The insertion site of the more recent Alu element is indicated in the alignments of the ape genome sequences (Figure 5). Monkeys, prosimians (tarsier, galago, aye-aye, lemur), and even some non-primates (whales and deer) retain the undisturbed target site.

Once the two Alu elements were in place, they could zip together in an RNA molecule, and sequester *TBXT* segment six in a loop structure (Figure 4). In this situation, the *TBXT* protein would be made without the structural component encoded by segment six, and it would possess aberrant activity. In mice, the experimental removal of segment six from the *TBXT* gene led to abnormal tail formation in many cases. It has been proposed that the Alu-mediated *TBXT* abnormality comprised a first step in tail loss, and that subsequent genetic events ensured permanent taillessness.[18]

This seems to be a case of evolution by reduction—a case of less is more. An ape-specific Alu element destabilised the *TBXT* gene and inhibited its activity, so that the tail failed to develop. Loss of the tail may have promoted or expedited the development of bipedality and liberated hominoid forelimbs to engage in delicate manipulations such as are required in the use of tools, fabrication of artefacts, and writing.

18 Bo Xia, Weimin Zhang, Aleksandra Wadzinska et al., "The Genetic Basis of Tail-Loss Evolution in Humans and Apes," *BioRxiv* https://doi.org/10.1101/2021.09.14.460388.

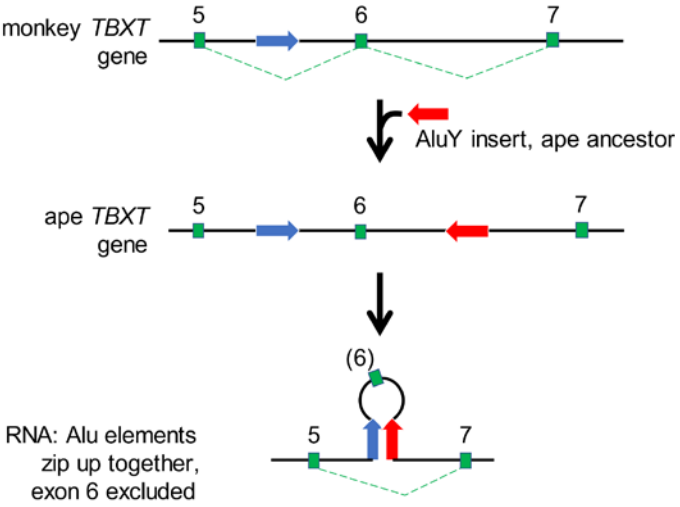

Figure 4. Alu elements suppress activity of the TBXT gene needed for tail development

The figure shows the arrangement in monkey DNA (with an Alu element between TBXT gene segments 5 and 6), in ape DNA (with a second Alu element appearing between segments 6 and 7), and in ape RNA, in which the blue and red Alu elements zip up together (hybridise), excluding the sixth segment of the TBXT gene in a loop. The protein made from such RNA molecules will lack amino acids encoded by this segment and will be defective. Early events in tail formation will be suppressed. From Xia et al. (2021), ref. 18.

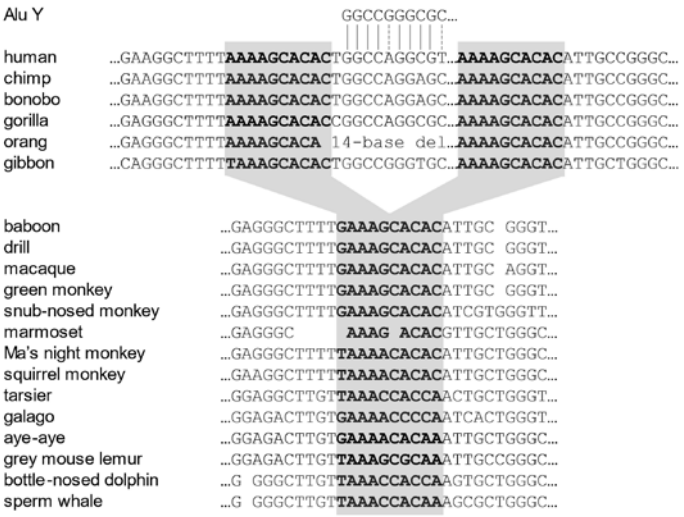

Figure 5. An Alu insert that may interfere with a gene TBXT needed for tail development

The Alu-Y element is found in all apes. The undisturbed target site is present in monkeys and prosimians, and also survives in Antarctic Minke whale, orca, red deer (sequences from which are not shown).

Alu elements are well-known to influence the readout of genes into which they insert. Hundreds of cases of Alu-modified genes active in the frontal cortex of human brain have been documented. The implications of these are currently unknown.[19] Overall, these discoveries show that randomness in genetic operations—mutational events—can create new information and underlie evolutionary changes that have led to characteristic phenotypes of the human species. Such mutations must occur in the context of constraining selection.

The genomes of essentially all organisms seem to entertain diverse populations of mutagenic ERVs and TEs. The ubiquity of such

19 Liliana Florea, Lindsay Payer, Corina Antonescu et al., "Detection of Alu Exonization Events in Human Frontal Cortex From RNA-Seq Data," *Frontiers in Molecular Biosciences* 8 (2021): 727537, DOI: 10.3389/fmolb.2021.727537.

genetic parasites may seem counter-intuitive, given their propensity to cause disease. But over evolutionary timescales, ERVs and TEs may generate the genomic flexibility that is required to enable evolution to proceed. Indeed, exposing organisms to stressful conditions may increase the activity of such agents and promote evolvability.[20] Levels of randomness may be tuneable. The generation of randomness (in the context of rational selection) is a profoundly efficient way to navigate through environmental challenges.

The necessity of randomness for our daily survival is shown by our adaptive immune system. The production of antibodies requires that antibody genes undergo elevated levels of random mutagenesis (in this case, small changes in DNA sequence), followed by selection of those variants that confer the greatest advantage for our survival—and in a timeframe of weeks. In each developing B cell clone, mutations in antibody genes generate a range of antibody proteins. The presence of antigen selects for those cells that produce antibodies with the tightest fit for the inducing antigen. Immunity thus demonstrates the power of variant generation (mutation) with natural selection. The evolution of a single clone of antibody-producing cells following COVID19 immunisation is depicted in Figure 6.[21]

The development of Darwinian mechanisms of antibody generation also indicates that random mutagenesis in the context of lawful selection can be deeply purposive. Mechanisms of evolution need not be dressed up in an ateleological (purpose-denying) metaphysical garb.[22]

20 Elizabeth A. Mojica and Dietmar Kültz, "Physiological Mechanisms of Stress-Induced Evolution," *Journal of Experimental Biology* 225 (2022): 243264, DOI: 10.1242/jeb.243264.

21 Wooseob Kim, Julian Q. Zhou, Stephen C. Horvath et al., "Germinal Centre-Driven Maturation of B Cell Response to mRNA vaccination," *Nature* 604 (2022): 141–145, DOI: 10.1038/s41586-022-04527-1.

22 Graeme Finlay, "The Immune System: Unity in Community," *Science and Christian Belief* 34 (2022): 29–49.

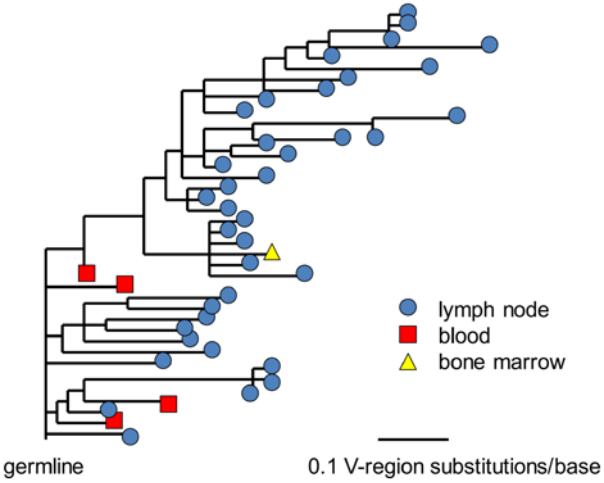

Figure 6. Evolution of a clone of B cells making anti-SARS-CoV-2 antibodies

An evolutionary tree of a single clone of antibody-forming cells between four and 29 weeks following immunisation with SARS-CoV-2 vaccine. Genes encoding antibodies are subject to random mutagenesis followed by selection of those that best fit the viral (spike) antigen. The length of the horizontal lines indicates the number of DNA base change mutations (substitutions) as indicated by the scale bar. The V (or variable) region of an antibody molecule is about 110 amino acids long, undergoes high rates of mutation, and provides the interface that binds to target antigens. Abstracted and adapted from Kim, Zhou, Horvath et al. (2022), ref. 21.

Processes that are random at the micro-level emerge into highly ordered and predictable phenomena at the macro-level. Physicist Tom McLeish has described how randomness or chaos of molecular processes (like Brownian motion) give rise, in the context of lawful constraints, to emergent order in living cells. The science of statistical mechanics provides an understanding "of how predictable, ordered structure and behaviour at the macroscopic scale emerged from a microscopic world of disorder." McLeish considers that this insight "is

one of the most remarkable achievements of physics over the last century and a half."[23]

Christians may gladly accept that "local chaos can give rise to large-scale structure when there are additional constraints, that creation harnesses the power of random forces without suppressing them, but rather by directing them into paths and processes, even extending them to the processes of life itself." Random mutations can give rise to the macroscopic properties of the developed organism.[24] ERVs and TEs in all their stochasticity have contributed to a creature that is human rather than, say, chimp. The evolution of life itself can be seen to fall "into the category of ordered large-scale structure emergent from random small-scale dynamics."[25] Random mutations can underlie predictable trajectories of evolution.

McLeish has extended the theme of "chaos to emergent order" to the whole of life. The biblical character of Job questioned the random events that afflicted him at the micro-level of his own existence. God's answer pointed him to the emergent order and beauty manifested in the universe at the macro-level. There seems to be an apparent lack of control in the "microscopics" of mutation and other disruptive influences, but we (with Job) should recognise how such creative energies "unfold the possibilities of the created order."[26]

Creation

The representative studies discussed above indicate that particular genetic events, describable at atomic resolution, have contributed to aspects of our humanness. Random events (in the appropriate context) can indeed generate new information and, during human development, modify regulatory circuitry. A long history of such events has led to the advent of *Homo sapiens*.

23 Tom McLeish, "Evolution as an Unwrapping of the Gift of Freedom," *Scientia et Fides* 8 (2020): 43–64, DOI: http://dx.doi.org/10.12775/SetF.2020.014; quote from p. 48.
24 McLeish, "Evolution," 48–49.
25 McLeish, "Evolution," 49.
26 McLeish, "Evolution," 58.

Such discoveries provide some clarity to our earlier question pertaining to a creator. Evolutionary process is complete in its own mechanistic terms. A god conceived as a component of DNA biochemistry is indeed redundant. Matter has within itself the potential to complexify. But the question of a creator has more to do with why there should be matter, why it should possess potentiality, and why there should be a drive to complexification. As cosmologist Heino Falcke has stated, scientists "have come better to understand the rules of the game in the universe, but where the game and where the rules come from, this we haven't answered."[27]

The elucidation of biochemical mechanisms underlying evolution has nothing to say about God as creator. Such a God can be considered only as the source of the entire system. If we are to think biblically, we must recognise that the atoms constituting DNA, the characteristically random but intelligible behaviour[28] intrinsic to mutagenic agents (such as ERVs and TEs), and the context in which mutations undergo selection, are all components of created reality.

Biblical creation is expressed by the Hebrew word *bara* (which is used exclusively of God's action) and by many broadly synonymous terms.[29] Creation/*bara* and its synonyms essentially describe the authority of God over creation, and indicate that physical entities and the processes in which they engage are conceived, willed, and effected by God.[30] Such terms encompass God's authority over familiar phenomena that are regarded as wholly natural (such as the wind and rain).[31] Creation/*bara* denotes divine sovereign effectuation,[32] a divine bringing into being, and relates to happenings (judgment and redemption), conditions (light and darkness), acts of God's saving righteousness, and

27 Heino Falcke, *Light in the Darkness: Black Holes, the Universe and Us* (London: Wildfire, 2021), 285.

28 As noted above, randomness is ordered, as described by statistical mechanics. See Tom McLeish, *Faith and Wisdom in Science* (Oxford: Oxford University Press, 2014), 100–101.

29 Howard J. Van Till, Robert E. Snow, John H. Stek, and Davis A. Young, *Portraits of Creation* (Grand Rapids, MI: Eerdmans, 1990), 208–211.

30 Van Till et al., *Portraits*, 213.

31 Van Till et al., *Portraits*, 214, 216.

32 Van Till et al., *Portraits*, 218–219, 221.

the transformation of a person's heart to a state compatible with God's holiness.[33]

One of these meanings has to do with *existence*, the gift of *being*.[34] The biblical concept of creation implies the traditional idea of *creatio ex nihilo*—creation out of nothing.[35] The famous "Let there *be*" statements of the first Genesis creation story[36] have everything to do with the conferral of *being*. That God's creative work is to give *being* is reflected in one of the great creation Psalms: "For he spoke, and it came to *be*; he commanded, and it stood firm."[37]

In Athens, St Paul quoted a pagan philosopher, Epimenides, with approval: For in God "we live and move and have our *being*."[38] Paul wrote in his magnum opus, the letter to the Roman Christians, that God's "command brings into *being* what did not exist."[39] And Paul emphasised the all-encompassing scope of God's work in an outburst of praise, "For all things were created by him, and all things *exist* through him and for him. To God be the glory forever! Amen."[40] In the heavenly vision of St John,[41] God is worshiped for the gift of *being*, of *existence*: "You are worthy, our Lord and God, to receive glory and honour and power, for you created all things, and by your will they were created and have their *being*."

The gift of existence may be variously nuanced. Walton informs us that Western thought tends to understand creation, being, or existence in physical terms.[42] In contrast, the ancient Hebrews understood that something existed "by virtue of its having a function in an ordered system"—in particular, according to how it related to society and cul-

33 Van Till et al., *Portraits*, 208.
34 Van Till et al., *Portraits*, 213.
35 Adrio Konig, *New and Greater Things* (Pretoria: UNISA, 1988), 102–104, 120 (allowing that a diversity of metaphors describing creation is used in scripture).
36 Gen 1:3, 6, 14.
37 Ps 33:9, NIV.
38 Acts 17:28, NIV; or *exist*, GNT.
39 Rom 4:17.
40 Rom 11:36, GNT.
41 Rev 4:11, NIV.
42 John H. Walton, *The Lost World of Genesis One* (Downers Grove, IL: IVP, 2009), 23–25.

ture.[43] People's ontology, their understanding of reality, focused on what they believed to be its most significant feature.[44]

If we apply Walton's proposal to genetics, we might suggest that divine creation pertains not only to the existence of biomolecules such as DNA, but to the functional capacities of DNA. It is an extraordinarily stable repository of information (continually responsive to, and updated by, environmental influences that impinge upon organisms), with sufficient mutability to be a vehicle for the development of spectacularly diverse life forms, and the genetic substrate of at least one creature that could respond in adoration to God's address.

Confusing Creation

Some materialist authors claim that biological evolution justifies atheistic belief. This is absurd, for how can we imagine a history—any history—as being an alternative to the conception that the cosmos in which it occurs is created, ordered, and sustained by God? There can be absolutely no incongruity in accepting the findings of historical science (including evolutionary genetics) and believing that everything accessible to science is ordained by God.

Some materialistically minded science writers have proposed that, if the cosmos was proven to emerge from a prior state (say the quantum vacuum), then the need for a creator is thereby obviated. For example, the cosmologist Lawrence Krauss has promoted the idea that the universe arose from "almost nothing"—where the pre-existing "almost" includes the laws of physics, the spectrum of fundamental particles,[45] and the provision of highly structured quantum fields. "In a Christian understanding, that provision would be the continuing act of the Creator."[46]

43 Walton, *Lost World*, 26, 35, 53; and associated Chapters 4–6.
44 Walton, *Lost World*, 28.
45 Roland Ashby, Chris Mulherin, John Pilbrow, and Stephen Ames, *A Reckless God?* (Reservoir, Victoria: Morning Star, 2018), 44–45; comment on fundamental particles is from Professor Jeff Tallon, personal communication.
46 John Polkinghorne, *Science and Creation* (London: SPCK, 1988), 60.

David Bentley Hart chides such materialists for their crude verbal trickery. The transition from any preexisting physical reality to our own familiar universe is purely a change from one state to another and has no relevance to the question of *being*.

Hart has said that "all physical events … are embraced within the history of nature, which is to say the history of what already has existence. The question of existence, however, concerns the very possibility of such a history." In other words, the biblical concept of creation encompasses the whole of physical reality. "Any quantum fluctuation [within an existing quantum system] that produces, say a universe is a new state within that system, but not a sudden emergence of reality from nonbeing."[47]

Stephen Hawking proposed that the cosmos is like a fuzzy spacetime egg without a beginning or an end. He asked whether such a boundary-less universe allowed any room for a creator. John Polkinghorne responded that Hawking's proposal was scientifically interesting but theologically inconsequential, for God is present in every place, "as the sustainer of the self-contained spacetime egg and the ordainer of its quantum laws." God is not limited by boundaries.[48] Hart quotes the theologian E. L. Mascall with approval: God is not "just one item, albeit the supreme one, in a class of beings," but is rather "the source from which their being is derived."[49]

We dare not confuse biblical *creation* with any physical or biological process belonging to the category of *evolution*. A biblical concept of creation entails that all of reality—every atom, every photon, and every instant of time—is given existence by God. As Douglas Spanner said in 1987, "in the Bible, the *creative* aspect of God's activity … is never linked to a particular time, place, process or material; the act is seen rather as an unanalyzable movement out of the infinity of God's thoughts into the finiteness of time and space and all that fills them."[50]

47 David Bentley Hart, God: *Being, Consciousness, Bliss* (New Haven: Yale University Press, 2013), 98.
48 John Polkinghorne, *Science and Christian Belief* (London: SPCK, 1994), 73.
49 Hart, *God*, 108.
50 Douglas C. Spanner, *Biblical Creation and the Theory of Evolution* (Exeter:

Evolution then (whether it describes the development of the cosmos, of life, or of the piano) is a created process. Creation and evolution cannot be alternatives. Evolutionary history is a process situated within God's created world.

The astronomer Howard Van Till has provided useful distinctions between the scientific investigation of the world and the biblical idea of creation. Science focuses on the cosmos in terms of its coherent properties, its lawful behaviour, and its authentic history. The Judeo-Christian idea of creation, however, considers the cosmos as an ever-dependent reality in relation to its creator. God is its Originator, Preserver, Governor, and Provider.[51] Thus, while science investigates the relationships between component parts of the world, theology in its metaphors describing creation depicts the relationship between the world and God.[52]

Brueggemann has stated that, to Israel, creation was "covenantally ordered; that is, formed for continuing interaction of gift and gratitude, of governance and obedience." God's action in creation is never the expression "of raw, sovereign power," but is rather characterised by "covenantal, ethical intentionality."[53] Discourse on evolution is stringently limited to physical phenomena, whereas that pertaining to creation expands the vistas to purpose, faithfulness, and hope.

God's Gift of *Being*: Implications

A criterion of the validity of a scientific hypothesis is that it should be *fruitful*—that it should throw unexpected light on other questions relating to physical reality. A valid theological insight should have the same capacity to make sense of diverse questions of our experienced reality—albeit issues that are personal (not mechanistic) ones. Of relevance

Paternoster, 1987), 35.

51 Howard Van Till, *The Fourth Day* (Grand Rapids: Eerdmans, 1986), xiii–ix; 62–65.

52 Van Till, *Fourth Day*, 64.

53 Walter Brueggemann, *Theology of the Old Testament* (Minneapolis, MN: Fortress, 1997), 157–58.

to the current discussion, the biblical concept of creation enlightens and enriches central aspects of our humanity.

First, the concept of creation has provided the worldview conducive to the development of science.[54] Three senior physicists have written: "[Christianity] practically invented science. Or at least, the striking progress of science in the modern era had many of its roots in Christian theistic belief, and for four hundred years the Christian community has largely nurtured science and done it well."[55] To qualify this statement, it should be stressed that humanity at large has engaged in careful observation of the natural world, but the biblical depiction of the divine nature (for example, God's authority, wisdom, faithfulness, freedom, goodness, and glory) has provided *presuppositions* that enabled science to flourish. The understanding of our world *as creation* has been hugely fruitful for the growth of science and the benefits flowing from it. That the biblical concept of creation has facilitated the development of science is evidence that the Hebraic understanding of the creator God entails a singularly valid purchase on reality. There is something special about biblical ontology.

Second, our status as created beings gives us identity and dignity. A scientist's perusal of human DNA sees that of just another ape. The human DNA sequence is most similar to that of chimps, followed by those of gorillas and orangutans (Figures 1, 2, 5). Genes in these related species are similarly interspersed amongst a jumbled concatenation of ERVs and TEs (over 99% of which are shared between human and chimp genomes). But we are not an inconsequential byproduct of selfish DNA. We are hominoid primates valued, loved, and called by God. Our physicists write that "we are not just forced into being but called into being. That is, we—all humans—and the other animals too,

54 Christopher Kaiser, *Creation and the History of Science* (London: Marshall Pickering, 1991); Harold Turner, *The Roots of Science* (Auckland: DeepSight Trust, 1998); Mark Worthing, *Unlikely Allies: Monotheism and the Rise of Science* (Eugene, OR: Wipf and Stock, 2019); Graeme Finlay, *God's Gift of Science: Theological Presuppositions Underlying Exploration of the Natural World* (Eugene, OR: Wipf and Stock, 2022).

55 Andrew Briggs, Hans Halvorson, and Andrew Steane, *It Keeps Me Seeking* (Oxford: Oxford University Press, 2018), 9.

to a more limited extent, are not just forced into existence by the inexorable and blind processes of the physical world … We are called, as people, by one who so calls. We are talked into talking, loved into loving, and forgiven into forgiving."[56]

Materialistic writers loudly proclaim their creed that the universe is devoid of ultimate significance or purpose. They deny that goodness, compassion, or justice are written into the structure of reality. Such a nihilistic creed is fine for wealthy celebrities. But one would expect it to be inimical to the wellbeing of people struggling to find their identity in the fickle currents of contemporary ideologies. In principle, the understanding of genetic process cannot speak to the mystery of human uniqueness as *Homo credens*—believing humanity. To our physics professors, "the analysis and description of a process cannot, logically, even address the issue of the overall meaning and purpose of that process, nor can it address what made it possible for that process to happen in the first place."[57] The dissection of genetic events in our evolution is deeply fascinating at an intellectual level, but it is the knowledge of God as the source and goal of our being that guarantees our inalienable value as persons. Cosmologist Heino Falcke has said that science tells us how small we are; theology tells us how valuable we are.[58]

We were formed in utero by genetic programmes (in dependence on environmental conditions) that were constructed during evolutionary history at least partially by the stochastic activities of retroviruses and transposable elements. But these impersonal processes have enabled us to enter into the dimension of the personal and the relational.

> Natural selection, as it were, discovered [the very concept of personhood]; it does not cause it. Natural selection favoured the eventual emergence of complex creatures able to embody personhood; when this emerged, it could not do other than embody what personhood is. The "mystery of our existence" is, in fact, very

56 Briggs et al., *It Keeps Me Seeking*, 2.
57 Briggs et al., *It Keeps Me Seeking*, 186.
58 Falcke, *Light in the Darkness*, 290.

> much about the nature of personhood. The nature of personhood is not explained by the physical process through which it became embodied in the physical world.[59]

Third, the idea of creation provides reassurance in the face of pervasive chaos. To Stanley Jaki, the faith of ancient Israel "emphasised the idea of the utter dependence of everything on one single Being." In the second creation story of Genesis 2, "there is only one effective cause"—God—who "is not challenged or complemented" by anyone or anything else.[60] The Hebrews had a highly confident vision of nature, as a home for humanity, where humans could develop their unique potentialities. The cosmos was "not an agglomerate of capricious events and processes" subject to the domination of unpredictable and dark forces.[61] Jaki had in mind the connection between Israel's faith in the creator God and the later development of a scientific vision of nature. But Israel's faith in the covenantal God also underlays attitudes of virtue and positivity in which human wellbeing could flourish.

To Israel, creation was made for glad dependence on God and fruitful obedience to God.[62] Creation faith focuses our attention on personal realities rather than mechanistic speculation or explanation. "It invites wonder, awe and gratitude that life—Israel's life, human life—is situated in the midst of a reliable generosity that precedes all human effort."[63] Creation addresses human wellbeing and flourishing in a way that scientific categories in principle never can. As the wondering Hebrew poet expressed it:

> When I consider the heavens, the work of your fingers,
> the moon and the stars which you have set in their place,
> what are mere mortals that you are mindful of them,

59 Briggs et al., *It Keeps Me Seeing*, 188.
60 Stanley Jaki, *Science and Creation* (Edinburgh: Scottish Academic Press, 1986), 139–140.
61 Jaki, *Science and Creation*, 148, 150.
62 Brueggemann, *Theology*, 149.
63 Brueggemann, *Theology*, 156.

> human beings that you care for them?[64]

Fourth, the rich and fertile Hebraic concept of creation gives credence to the hope of future development, of perfectibility, in God's reality. The splendour of this world has been attained at a concomitant cost. Biological history has issued in disease, suffering, and death. Human history is a story of barely mitigated savagery. The belief that creation comes from a good God generates the haunting hope that creation is not complete[65] and that a cosmos freed from its slavery to decay may be anticipated. A different sort of reality, of cosmos, must be expected in which suffering and human savagery can no longer exist.

Brueggemann (citing Jon Levinson) has said that "something untamed and destructive" remains loose in the world; and that it still needs to be brought under the rule of God. "Creation faith is the summons and invitation to trust" in this God, "even in the face of day-to-day, palpable incursions of chaos." The testimony of Israel is that God "can be trusted in the midst of any chaos, even that of exile and finally that of death."[66]

Creation faith precedes and enables the anticipation of a new creation, that this world will be transformed into one in which (through God's own sacrificial involvement in Jesus) the suffering and evil endemic to current reality will be extirpated.[67] "God was in Christ reconciling the world [κόσμον] to himself."[68] As an aspect of this, human savagery will be replaced by the creation of a new humanity.[69] And individuals will be (are being) created anew as new people.[70] For "God has made us what we are, and in our union with Christ Jesus he has created us for a life of good deeds, which he has already prepared for us to do."[71] Of course, a proposal or idea is not true simply because it

64 Ps 8:3–4.
65 Konig, *New and Greater Things*, 159.
66 Brueggemann, *Theology*, 159.
67 Isa 65:17; 2 Pet 3:13; Rev 21:1.
68 2 Cor 5:19.
69 Eph 2:15; Heb 8:8–13.
70 2 Cor 5:17.
71 Eph 2:10.

is convenient. It is true because it makes sense of the real world we experience.

In conclusion, we can confidently accept both the molecular genetic evidence of our development through evolutionary history and the fruitful biblical assertion that we are created beings. The scientific and theological perspectives on our nature are complementary and highly enriching. Together they provide a coherent (although still incomplete) understanding of our nature as evolved hominoid primates who find their fulfilment in encountering God as creator and redeemer.

The author reports there are no competing interests to declare.
Received: 06/12/22 Accepted: 02/03/23 Published: 07/03/23

Recovering Genesis One from Scientific and Societal Misunderstanding

Alan Dickin

Abstract: The Genesis 1 creation story is an enigma to modern society because it reads like a historical account, and yet does not accord with scientific descriptions of origins. The cosmic temple model explains some of the puzzling features of Genesis 1, including its six/seven-day structure. However, it leaves many unanswered questions, including the watery beginning of the earth, in contrast to the desert-like beginning of creation in Genesis 2. Nevertheless, the watery beginning and seven-day structure of Genesis 1 provide links with the biblical and Mesopotamian Flood stories. In addition, the stages of creation in Genesis 1 seem to closely mirror the re-creation of the earth after the Flood. This leads to the suggestion here that Genesis 1 was revealed as a series of visions inspired by the experience of Noah's Flood. Inspiration of the creation story by the cosmic Flood would have grounded the account in historical reality, and also served to intensify its spiritual message. However, this implies that attempts to find concordance between Genesis 1 and scientific accounts of origins are mistaken. Instead, seeing Genesis 1 as a True Myth inspired by the Flood imparts the reality of God's creation at a deeper level of human experience than a rational scientific explanation could ever achieve.

Keywords: creation; flood; history; spiritual intensification; true myth; watery chaos

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Alan Dickin (DPhil, Oxford) is Emeritus Professor of Geology at McMaster University, Ontario, Canada, where he worked in the School of Earth Environment and Society. His books include *A Scientific Commentary on Genesis 1–11* (2015) and *From the Stone Age to Abraham: A Biblical History of the Ancient World* (2021).

"Christianity as a faith is fundamentally grounded in history." When we say this, we mean that God's principal means of revelation, his eternal Word, was manifested in the historical person of Jesus; but we also mean that the life of Jesus is authoritatively brought to us through the Bible. According to Christian orthodoxy, Jesus is revealed to us through the eye-witness accounts of the apostles, which are recorded in the New Testament. This means that, to believers, the New Testament equates to what we would normally think of as history: an accurate record of the life of Jesus and the early Church. However, history to historians is a bit more complicated.

Human history arises from the contested arena of human affairs, where people (especially powerful people) can make false claims to further their own interests. If these false claims are recorded, they become part of the historical record, and must be sifted by historians for their accuracy or otherwise. A good example is found in Matthew 28, which records the bribing of the soldiers who guarded Jesus' tomb, so that they would make the false claim that Jesus' disciples stole his body. As Christian believers, we accept that the Gospel story is an accurate record of the false story circulated by the temple priesthood.

Christian orthodoxy also maintains that the principal purpose of the Old Testament is to witness to Jesus, in the sense that it points forwards to Jesus prophetically, but also tells the story of how God worked in the world to prepare humanity for Jesus' coming (e.g., Luke 24:27). It affirms that God worked through human agents, the patriarchs and the prophets, who served God as a demonstration of their faith. Perhaps the clearest statement of this principle is made in Hebrews 11, which summarises some of these acts of faith as models for the letter's readers. If the acts of faith were not real, these models would lose much of their power, because they could not then serve as testimonies to the God who vindicates the faith of his people.

The list of the faithful in Hebrews 11 begins with Abel, Enoch, Noah, and Abraham, before going on to mention many of the later prophets. However, the New Testament as a whole clearly recognises Abraham as the "Father of Faith." This is affirmed in the letters of Paul,

but also in the recorded dialogue between Jesus and the Jews (e.g., John 8). This affirmation is made despite the lack of any testimony of the existence of Abraham from outside the Bible. In contrast, the story of the Flood hero (biblical Noah), and his obedience to God in building the Ark, is recorded not only in the Bible but in also in several ancient Mesopotamian sources.

Was Noah's Flood a real event? Contrary to much scholarly opinion, there is considerable evidence for Noah's Flood as a real event, whereas disbelief in the reality of the Flood is largely based on misunderstandings of the texts.[1] For example, Genesis describes the enormous dimensions of the Ark, but does not say that it was a ship. The horizontal dimensions of Noah's Ark correspond to the area of a one-acre field, the same size as the craft described in the Mesopotamian sources. On the other hand, the height of the Ark most likely describes the height of a reed-built shrine, built on a raft surfaced with asphalt that was more like a floating farmyard than a container ship.[2] Thus, by focusing on the commonality of the Mesopotamian and biblical sources, we obtain a version of the Flood story that is historically credible. This historicity of biblical faith is important for modern society because it builds bridges with the scientific method; both are founded on the accurate recording of events by human eye-witnesses.

Genesis 1 as History?

The example of Noah's Ark suggests that Genesis may come closer to an eye-witness account of ancient events than is generally supposed. But where does this leave Genesis 1? Genesis 1 (taken to include the first four verses of the second chapter) describes the creation of the cosmos, including humankind, in what appears to be six human days; but this does not seem to be scientifically possible.

1 Alan P. Dickin, "New Historical and Geological Constraints on the Date of Noah's Flood," *Perspectives on Science and Christian Faith* 70:3 (2018): 176–177.

2 Alan P. Dickin, "The Design of Noah's Ark and Its Significance for Biblical Faith," *Perspectives on Science & Christian Faith* 74:2 (2022): 92–105.

Based on its direct and straightforward manner, Genesis 1 appears to be a factual description of the creative process. Indeed, this understanding seems to be specifically endorsed by the text of the Fourth Commandment: "For in six days the Lord made the heavens and the earth, the sea, and all that is in them, but he rested on the seventh day. Therefore, the Lord blessed the Sabbath day and made it holy" (Exodus 20:11). Because this text comes from the foundations of the Mosaic Law and is attributed in Exodus to the direct words of God, it has often been taken as a statement that God made the universe in six human days, and therefore represents a "historical" description of the creation of the cosmos. However, such an understanding has also been a stumbling block throughout the life of the Church.

Augustine warned that a naïve interpretation of Genesis 1 could provoke ridicule of the Church.[3] He believed that the universe was actually created in an instant, but that God described the process of creation over six days as a vehicle for communicating this abstract idea to the unlearned.[4] However, if the account of Genesis 1 was an "accommodation" to human understanding, Augustine was unable to explain the enigma of why God apparently created light on day 1, three days before he made the sun.[5]

Augustine's confusion was seized upon by Martin Luther in his own commentary on Genesis, where he admonished that if we do not understand the days of creation, we should trust in God and admit our ignorance.[6] Hence, both Luther and Calvin affirmed the literal creation of the cosmos in six human days, a belief followed by many modern fundamentalists. However, these modern followers are probably unaware that the Reformers also believed that the sun rotated around the earth and that the moon was literally on fire.[7]

3 Augustine of Hippo, *The Literal Meaning of Genesis* 1.19, trans. John H. Taylor, Ancient Christian Writers 41 (New York: Newman Press, 1982).
4 Augustine, *The Literal Meaning of Genesis* 1.14.
5 Augustine, *The City of God* 11.6–7.
6 Martin Luther, *Commentary on Genesis* 1, in *Luther on the Creation: A Critical and Devotional Commentary on Genesis*, ed. John N. Lenker (Luther in All Lands Co., 1904), 41.
7 John Calvin, *Commentaries on the First Book of Moses*, in *Calvin's Commentaries*,

Others have attempted to find concordance between science and Genesis 1, either by interspersing literal days of creation between long geological ages, or by understanding the "days" of creation as stretching out over geological eons. Hugh Miller attempted a geologically informed nineteenth-century presentation of this idea,[8] while its most prominent modern proponent is Hugh Ross.[9] However, such attempts always involve violence to the text, forcing it into a pattern that was clearly not intended by the ancient author. For example, Ross proposed that the darkness of the early Earth (Genesis 1:2) was caused by an opaque blanket of orbital debris. However, scientific analysis of this model shows that such a blanket would have effectively insulated the earth, evaporating the oceans and creating a sea of molten rock instead.[10]

The Cosmic Temple Model

The difficulties in finding concordance between Genesis 1 and a scientific account of origins suggests that more attention should be devoted to finding the reasons for this discrepancy. The cosmic temple model explains this lack of concordance by setting the Genesis 1 creation story in an ancient cultic environment. For example, John Walton argued that Genesis 1 describes "the period of time devoted to the inauguration of the functions of the temple, and perhaps also its annual reenactment."[11]

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vol 1, ed. John King (Calvin Translation Society, 1847; reprinted Grand Rapids: Baker Book House), 46.

8 Andrew Brown, *The Days of Creation: A History of Christian Interpretation of Genesis 1:1–2:3* (Dorset: Deo Publishing, 2014), 248.

9 Hugh N. Ross, *Creation and Time: A Biblical and Scientific Perspective on the Creation-Date Controversy* (Colorado Springs: Navpress Publishing Group, 1994).

10 Chushiro Hayashi, Kiyoshi Nakazawa, and Hiroshi Mizuno, "Earth's Melting Due to the Blanketing Effect of the Primordial Dense Atmosphere," *Earth and Planetary Science Letters* 43 (1979): 22–28, https://doi.org/10.1016/0012-821X(79)90152-3.

11 John H. Walton, *The Lost World of Genesis One: Ancient Cosmology and the Origins Debate* (Downers Grove: IVP Academic, 2009), 92.

The idea of the cosmos as a giant temple-like edifice is expressed by the use of building metaphors to describe the cosmos in several biblical texts. These accounts emphasise architectural elements, such as the foundations of the earth (Psalms 102 and 104), the pillars of the earth (1 Samuel 2:8), the pillars of the sky (Job 26:11), and the roof of the sky (Job 37:18). Taken together, they seem to describe the cosmos as a kind of giant building with a three-tier structure (Figure 1) consisting of the heavens, the earth, and the underworld (*sheol*).[12]

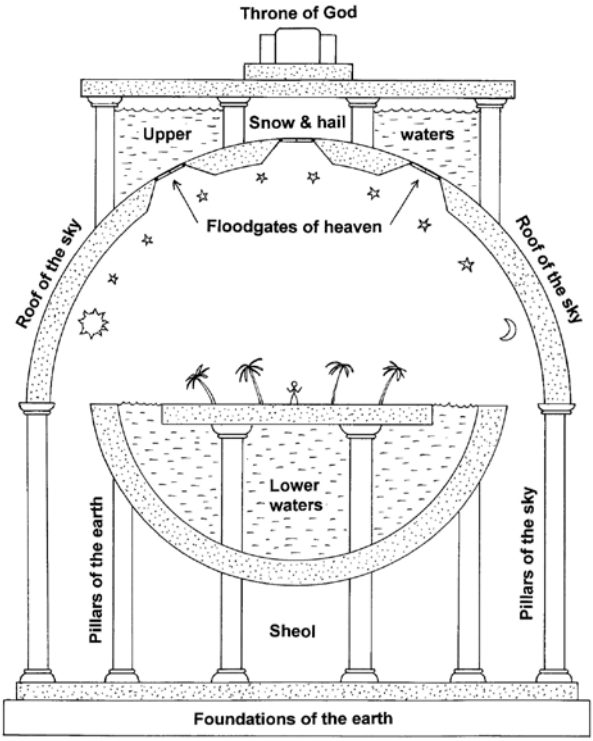

Figure 1. The ancient three-tier conception of the cosmos, based on descriptions in the books of Genesis, Job, and Psalms.

12 Paul H. Seely, "The Three-Storied Universe," *Journal of the American Scientific Affiliation* 21:1 (1969): 18–22.

This is an attractive idea, but when we try to understand the historical context of the cosmic temple inauguration and its reenactment, serious problems are encountered. For example, it seems clear that the cosmic temple is a metaphor, which must arise from the experience of a tangible human-built temple, where the hypothesised reenactment presumably occurred. However, this identification begs the question of what temple institution inspired the metaphor.

Walton noted that the Temple of Solomon had a seven-day inauguration ritual, which might fit with the seven days of Genesis 1.[13] However, if the inauguration of Solomon's temple also represented the inauguration of the cosmic temple, this would imply that the ancient priestly author saw Solomon's Temple as preceding the giving of the law, since the Fourth Commandment invokes the creation week as inspiration for the Sabbath (Exodus 20:8–11). This is precisely what Julius Wellhausen proposed, in what is normally termed the Development Hypothesis.[14] He argued that the Law was not given until after the building of the temple, but the price for this view was to treat the whole story of Moses, the Exodus, and the tabernacle in the wilderness as invented history. Obviously, this flies directly in the face of Hebrews 11, which claims Moses as one of the heroes of faith. Indeed, we may judge the orthodoxy of Wellhausen's position from the fact that he resigned from his university chair of theology because his teachings were undermining the training of students for Christian ministry.[15]

Genesis 1 as a Revelation to Moses?

As orthodox believers, we may take the history of divine revelation in the Bible seriously, but if we do not understand the *compositional* setting of Genesis 1, we may still not properly grasp its meaning. In

13 Walton, *The Lost World of Genesis One*, 90.

14 Rudolf Smend, "Julius Wellhausen and His *Prolegomena to the History of Israel*," in *Semeia 25: Julius Wellhausen and His Prolegomena to the History of Israel*, ed. Douglas A Knight (Chico, CA: Society of Biblical Literature, 1983), 1–20.

15 Roger W. L. Moberly, "Theological Interpretation, Second Naiveté, and the Rediscovery of the Old Testament," *Anglican Theological Review* 99 (2017): 651–670, https://doi.org/10.1177/000332861709900402.

a search for this compositional setting, Walton speculated that Moses himself might have composed the Genesis 1 creation account, even though his role for most of Genesis was more as a transmitter of earlier traditions.[16] In this suggestion Walton followed Duane Garrett (and earlier, Hugh Miller), who suggested that Genesis 1 might describe a vision or series of visions seen by Moses.[17] For example, the six-plus-one day structure of Genesis 1 might reflect events described in Exodus (24:16), when the cloud of God's presence covered Mount Sinai for six days, followed by a seventh day on which God called to Moses from within the cloud.

Although this idea provides a valid literary basis for the structure of Genesis 1, it is much more likely that the events at Sinai were *recapitulating* the previously established creation week of Genesis. A new (primary) revelation of Genesis 1 to Moses would create several major problems.

Firstly, it does not solve the problem of why Genesis 1 was cited as the basis for the Fourth Commandment. The reference to the creation week as the model for the Sabbath implies that the creation story was already known to the Israelites, not a new revelation to Moses. Indeed, the principle of the Sabbath seems to have existed before the covenant at Sinai, since it governed the collection of manna (Exodus 16).[18] One could argue that the sequence of events described in the Exodus narrative is not a historical account (as Wellhausen claimed), but in that case, why would the author undermine the stature of Moses by implying that a weekly day of rest, inspired by Genesis 1, existed before the giving of the Law? As universally recognised (e.g., Luke 16:29), Moses is the authority figure with whom the giving of the Law is asso-

16 John H. Walton and Brent Sandy, *The Lost World of Scripture: Ancient Literary Culture and Biblical Authority* (InterVarsity Press, 2013), 69.

17 Hugh Miller, *The Testimony of the Rocks, or, Geology in Its Bearings on the Two Theologies, Natural and Revealed* (Edinburgh: Thomas Constable, 1857; reprinted Edinburgh: Nimmo, Hay & Mitchell, 1889), 170; Duane A. Garrett, *Rethinking Genesis: The Sources and Authorship of the First Book of the Pentateuch* (Grand Rapids: Baker Book House, 1991).

18 Nahum M. Sarna, *Exploring Exodus: The Heritage of Biblical Israel* (Schocken Books, 1986), 146.

ciated, so any story that tended to undermine Moses' unique authority would be quite undesirable for a later author. On the other hand, the story of the rotting manna in Exodus 16 has all the marks of unwitting testimony to an earlier tradition, given as part of an account of God's supernatural provision in the desert.

A second problem with Genesis 1 as a new revelation to Moses is its ubiquitous use of the divine name Elohim, which conflicts with the new name Yahweh by which God revealed himself to Moses. Strictly speaking, the name Elohim is plural, and thus introduces a hint of plurality into the Godhead. This plurality is then more explicitly stated in God's intention to create humankind, "Let us make man in our image, in our likeness" (Genesis 1:26–28). Although the Church Fathers believed this to be a reference to the Trinity, most modern scholars interpret it as an address to the "Divine Council" (cf. Psalm 82).[19] Nevertheless, even a faint suggestion of the plurality of the Godhead in any revelation to Moses would have been very undesirable at Sinai, as the story of Exodus 32 demonstrates. This text claims that God interrupted his revelation to Moses because Aaron had let the Israelites run riot, with the claim, "These are your gods, Oh Israel, who brought you up out of Egypt" (Exodus 32:7). In other words, the plurality of gods invoked by the Israelite rabble was a direct threat to the Mosaic covenant. Therefore, as Karl Barth argued, the suggestion of divine plurality in Genesis 1:26 is more reasonably interpreted as a vestige of early biblical religion: "We cannot escape the conclusion that the saga thought in terms of a genuine plurality in the divine essence, and that the priestly redaction within which it is presented in Gen. 1 did not see fit to expunge this element."[20]

A third major problem with a new revelation of Genesis 1 to Moses is the watery beginning of Genesis 1:2, which seems completely out of place in the Sinai desert. Walton hinted at a possible answer to this

19 Gordon J. Wenham, *Genesis 1–15*, Word Bible Commentary (Waco, TX: Word Books, 1987), 27.

20 Karl Barth, *Church Dogmatics* 3.1, ed. G. W. Bromily and T. F. Torrance (London: T&T Clark, 1936), 192.

problem[21] when he quoted from Jan Assmann's summary of Egyptian temple and creation mythology: "The temple recalled a mythical place, the primeval mound. It stood on the first soil that emerged from the primeval waters, on which the creator god stood to begin his work of creation."[22]

This idea of the Egyptian temple invoking the primeval mound of creation was clearly based on the emergence of the land of Egypt from the yearly inundation of the Nile. But any suggestion that the opening statement of the Pentateuch could be based on an Egyptian temple mythology seems very problematic, since it runs counter to the whole ethos of the Exodus as an escape from slavery to the Egyptian gods (which included Pharaoh). Thus, the ten plagues of Egypt clearly expressed God's declaration: "I will bring judgment on all the gods of Egypt" (Exodus 12:12).

A more plausible explanation is that this Egyptian creation myth and its concept of a creator god both originated elsewhere. For example, there is clear evidence for a Mesopotamian influence on earlier Egyptian civilisation, based on the preservation of Mesopotamian artefacts and designs in the grave goods of Egyptian cemeteries.[23] Therefore, a more attractive inspiration for the watery origin of the biblical creation story is Mesopotamian mythology, which espoused a very similar watery creation, presumably based on the emergence of the land of Mesopotamia from the Cosmic Flood.

Consistent with a Mesopotamian origin of Genesis 1 *before* the events of Exodus, Stephen the Martyr claimed that God first revealed himself to Abraham in Mesopotamia, implying that Abraham could also have received stories of the creation and Flood from there: "The God of Glory appeared to our father Abraham while he was still in Mesopotamia, before he lived in Haran" (Acts 7:2). This claim is tempered

21 Walton, *The Lost World of Genesis One*, 80.

22 Jan Assmann, *The Search for God in Ancient Egypt*, trans. David Lawton (Cornell University Press, 2001), 38.

23 Luc Watrin, "From intellectual acquisitions to political change: Egypt-Mesopotamia interaction in the fourth millennium BC," *De Kêmi à Birît Narî (Revue internationale de l'Orient ancien)* 2 (2004): 48–95.

by the suggestion in the book of Joshua (24:2) that Mesopotamian religion, like that of Egypt, was based on idolatry: "Long ago your forefathers, including Terah the father of Abraham and Nahor, lived beyond the River and worshipped other gods." But the fact that idolatry was rampant in Mesopotamia at the time of Abraham does not preclude the worship of the true God in earlier Mesopotamian temples, in the period after Noah's Flood. After all, it was to Noah that God had apparently promised: "I now establish my covenant with you and with your descendants after you" (Genesis 9:9). This promise implies that, for some time after Noah, his descendants who settled in Shinar (Mesopotamia) were worshippers of the true God, and could have received the divine revelation of Genesis 1 as an ancient temple liturgy.

The Mesopotamian Context of Genesis 1

There is an obvious Mesopotamian example of how the cosmic temple idea could have worked as a religious liturgy, in the form of the Babylonian Creation Epic, *Enuma Elish*. According to an analysis of various textual sources by Wilfred Lambert, the Creation Epic was not only *recited* every year at the New Moon festival in Babylon, but a ritual reenactment of the central battle-scene of the epic was performed.[24] This therefore provides an analogy of how Genesis 1 could have worked as a liturgy that reinforced the theology of a temple institution. However, the content and belief systems of Genesis 1 and *Enuma Elish* are completely different.

The victory of the god Marduk over Tiamat (the deified sea) is the central focus of *Enuma Elish*, and a similar theme formed the centrepiece of the Ugaritic (Canaanite) Baal cycle, which described Baal's defeat of the sea god, Yam. Scholars like Lambert have interpreted these epics as politically motivated works, in which the gods were conceived anthropomorphically and therefore carried out human warfare on a cosmic scale.[25] In both epics the cosmic battle acted as a pretext to

24 Wilfred G. Lambert, "The Great Battle of the Mesopotamian Religious Year: The Conflict in the Akītu House (A Summary)," *Iraq* 25 (1963): 189–190.

25 Lambert, "The Great Battle."

justify the promotion of the victorious deity to be the new head of the pantheon, reflecting the victory of Babylon and Ugarit over their human enemies. Such second-millennium cosmic battle themes are referred to in Isaiah 27:1, showing that later biblical authors were aware of these myths.[26] In contrast, the absence of the battle theme from Genesis 1 is better explained by its earlier date, before human warfare had been "elevated" to a cosmic plane.

Another difference between Genesis 1 and *Enuma Elish* concerns the seven-day motif in Genesis 1, which is lacking in *Enuma Elish*. However, this motif is present in both the Mesopotamian and biblical Flood stories. In both the Atrahasis and Gilgamesh epics, the storm lasts for seven days and seven nights,[27] whereas the biblical account has repeated seven-day periods of waiting both before and after the Flood. Hence, this use of the seven-day motif could point to a relationship between the Flood story and the creation story of Genesis 1.

The idea that the Flood was like an undoing of creation is a well-established principle. Hints of it are found in Calvin's commentary on Genesis, where he sees the Flood reversing creation by breaking through the barriers that God had previously made to hold back the waters above and below the sky.[28] But the corollary of this picture is that when God remembers Noah and the flood-waters begin to subside, it genuinely appears that the earth is being "re-created" out of chaos in a way that parallels Genesis 1.

Re-Creation after the Flood

The idea of God re-creating the earth after the Flood is actually very old, and hints of it are seen in the Dead Sea scrolls. For example, in the *Genesis Apocryphon* (1QapGen), Noah is invited to rule over the earth in a manner very similar to the blessing of Adam on the sixth day of

26 John Blenkinsopp, *Creation, Un-Creation, Re-Creation: A Discursive Commentary on Genesis 1–11* (Edinburgh: T&T Clark, 2011), 37.

27 Stephanie Dalley, *Myths from Mesopotamia: Creation, the Flood, Gilgamesh, and Others* (Oxford University Press, 1989).

28 Calvin, *Commentaries on the First Book of Moses*, 192.

Genesis 1.[29] However, the most detailed exploration of these parallels was made by Kenneth Mathews in his *New American Commentary: Genesis 1–11*, quoted here with minor modifications.[30] Mathews notes specifically that the description of re-creation after the Flood (Genesis 8) uses key Hebrew words that are also used in Genesis 1. The English translations of these words are italicised in the following summary to emphasise the parallels.

- Pre-creation/Day 1. Just as God's *wind* (*ruach*) moved over the face of the watery abyss (1:2), God sends a *wind* (*ruach*) over the flood waters to renew the earth (8:1).
- Day 2. Just as God initially divided the waters to create the *skies* (*shamayim*, 1:8), God re-gathers the flood waters, closing the apertures of the *skies* (*shamayim*, 8:2).
- Day 3. Just as God gathered the water in one place and commanded dry ground to *appear* (*ra'eh*, 1:9), so again the tops of the mountains *appear* (*ra'eh*) after the Flood (8:5).
- Day 4. Just as the sun and moon were placed in the heavens to mark seasons, *days*, and *years* (*yom*, *shaneh*, 1:14), they reappear after the Flood to mark *days*, months, and *years* (*yom*, *shaneh*, 8:4, 13).
- Day 5. Just as birds were created to fly *above the earth* (*'al-ha'eretz*, 1:20), so the raven is released to fly back and forth (until the waters have dried up) *above the earth* (*'al-ha'eretz*, 8:7).
- Day 6. Just as various kinds of *living creatures* and *cattle* were created (*nephesh chay*, *behemah*, 1:24), so the *living* [creatures] and *cattle* are called out from the Ark (*chay*, *behemah*, 8:17).
- Day 6. Just as the human being was first made in the *image of God* (*tselem 'elohim*, 1:27), the human being is reaffirmed after the Flood as made in the *image of God* (*tselem 'elohim*, 9:6).

29 Torleif Elgvin, "The Genesis Section of 4Q422 (4QPara Gen Exod)," *Dead Sea Discoveries* 1 (1994): 180–196, https://doi.org/10.1163/156851794X00275.

30 Kenneth A. Mathews, *Genesis 1–11:26*, vol. 1 (Nashville: B&H Publishing Group, 1996), 383.

- Day 7. Just as God *rested* (*shabath*) on the seventh day of creation (2:2), so God smells the *restful* (*nichoach*) aroma of Noah's sacrifice after the Flood (8:21).

The Two Creation Traditions

Before we explore the significance of these parallels, it is important to examine the wider biblical context of the Genesis 1 creation story (up to Genesis 2:4a). For example, this account is immediately followed in Genesis 2 (verses 4b to 25) by a very different account of creation. Whereas Genesis 1 has a cosmic viewpoint, is impersonal in style, and is highly systematic in organisation, Genesis 2 has a local viewpoint, is anthropomorphic in style, and has a vivid story-like character. Beyond these differences in perspective, the accounts describe acts of creation in a different order and in very different environments. Whereas Genesis 1 begins in water and describes the creation of plants, then animals, then humanity, Genesis 2 begins with dry dust and describes the creation of the human being, then plants, then animals.

Recognising Genesis 1 and 2 as the products of two distinct traditions goes a long way to explaining their different character. However, because the creation stories of Genesis 1 and 2 are so different, and apparently contradictory, it is difficult to see how they could have been passed down orally in the same religious community—the two stories would have become intermingled. This means that if the story of creation was handed down through Noah and his family, it probably involved only one of these traditions. And although Genesis 2 now forms the second creation story, there is strong evidence that it originally stood alone. This comes from the presence of "not yet" statements in the introduction to the Genesis 2 creation account (2:4b-5, NIV): "When the Lord God made the earth and the heavens, no shrub of the field had yet appeared on the earth and no plant of the field had yet sprung up." This usage is typical of the beginnings of Sumerian literary works, and is found in the opening lines of the *Enuma Elish*: "When skies above

were not yet named nor earth below pronounced by name… When yet no gods were manifest."[31]

Genesis 2 also displays other evidence of being an early tradition, such as the primitive concept of animals not yet having names (Genesis 2:19). And because it has the style of a vivid etiological account of human experience, it would have been particularly suitable for oral transmission by Noah and his descendants.

According to the Documentary Hypothesis, Genesis 2–4 forms the beginning of the Yahwist source (originally abbreviated in German as J).[32] This J tradition could have remained in oral form for thousands of years, eventually being combined with a second oral narrative source (E) and written down in the time of Solomon. William F. Albright suggested that this type of material in Genesis formed part of an early epic tradition, possibly brought to Canaan by Abraham:

> J and E must reflect two recensions of an original epic narrative, the nucleus of which had presumably been recited by Hebrew rhapsodists before the Exodus…
>
> Much of the early high culture of the Hebrews as preserved in the books of Genesis and Exodus (rarely elsewhere), contains elements brought from Mesopotamia during the time of the Patriarchs, that is, no later than the sixteenth century B.C.[33]

In contrast to Genesis 2, the much more sophisticated account in Genesis 1 more likely originated in a Mesopotamian priestly setting. This is indicated by its formal structure, by the concept of God resting in his cosmic temple on the seventh day, and by a particular concern (Genesis 1:14–18) with the regulation of the liturgical calendar by heavenly lights (discussed further below).[34] Consistent with these characteris-

31 Dalley, *Myths from Mesopotamia*, 233.

32 Richard E. Friedman, *The Bible with Sources Revealed* (San Francisco: Harper One, 2003).

33 William F. Albright, *From the Stone Age to Christianity: Monotheism and the Historical Process* (John Hopkins Press, 1940), 249; William F. Albright, *Yahweh and the Gods of Canaan* (Doubleday & Co., 1968), 91.

34 Walter Vogels, "The Cultic and Civil Calendars of the Fourth Day of Creation

tics, Genesis 1 is identified as part of the Priestly source according to the Documentary Hypothesis.

The Ages of Documentary Sources

Most modern adherents of the Documentary Hypothesis regard the Priestly source as the youngest part of Genesis, composed during or after the Babylonian exile.[35] However, this opinion was strongly influenced by Wellhausen, who linked the Documentary Hypothesis to his Development Hypothesis for the evolution of Israelite/Jewish religion. As discussed above, this model assumed that the Law came after the Prophets, and that most of the Pentateuch was invented history. However, some recent scholars have recognised that these two models must be disentangled, so that the Documentary Hypothesis can be taken back to its basic *literary* form.[36] This has been called the Neo-documentarian approach by some scholars.[37]

At its most basic level, the Documentary Hypothesis quite reasonably supposes that the Pentateuch was composed from earlier sources, just as the gospels of Matthew and Luke were assembled from multiple sources.[38] This in no way devalues the historicity of the documentary sources. On the contrary, the existence of minor contradictions between the sources suggests that they were handed down with such reverence that the redactor did not feel free to editorially harmonise them. For example, the Priestly and Elohist sources give different accounts of the birth of Jacob's son Benjamin, but these differences are consistent with the well-established character of these sources. Thus, the Priestly source describes the birth of Benjamin in Paddan Aram

(Gen 1, 14b)," *Scandinavian Journal of the Old Testament* 11 (1997): 163–180, https://doi.org/10.1080/09018329708585113.

35 Gordon J. Wenham, *Exploring the Old Testament*, vol. 1: *A Guide to the Pentateuch* (Downers Grove: InterVarsity Press, 2003), 167.

36 Joel S. Baden, *The Composition of the Pentateuch: Renewing the Documentary Hypothesis* (Yale University Press, 2012).

37 David M. Carr, *The Formation of the Hebrew Bible: A New Reconstruction* (Oxford University Press, 2011), 111.

38 Hermann Hupfeld, *Die Quellen der Genesis und die Art ihrer Zusammensetzung: Von neuem untersucht* (Berlin: Wiegandt und Grieben, 1853), 195.

as part of a regimented summary of the birth of all of Jacob's children (Genesis 35:23–26). In contrast, the Elohist source gives a dramatic account of the death of Rachel while giving birth between Bethel and Ephrath (Genesis 35:16–18). The reluctance of the redactor to edit such conflicting accounts was cited by Garret as a major problem for the Documentary Hypothesis:

> It was assumed [by scholars] that each writer aimed to produce a single, continuous history but would tolerate no inconsistencies, repetition, or narrative digressions. The redactors, on the other hand, were said to be utterly oblivious to every kind of contradiction and repetition.[39]

But rather than undermining the Documentary Hypothesis, this observation provides important evidence for its operation. It suggests that the documentary sources had gained canonical authority over long periods of time before they were combined together, so that the redactor attempted at almost all costs to preserve them intact. This principle was well understood by Albright, who argued that the Documentary sources grew separately and alongside one another over a long period of time, before their combination during or after the exile: "Since many traditions embedded in our three sources were formed and even phrased at different times, we have a staggered chronological relationship between them which greatly enhances their historical dependability."[40] In fact, some of the differing character of the sources may reflect their parallel evolution as either oral or written traditions. Thus, J and E almost certainly represent epic oral sources that separately preserved the tribal traditions of Judah and Ephraim, whereas the Priestly source was probably written down at an early date.[41]

Because oral sources are easily updated, older names of God can be replaced by new names. For example, Genesis 4:26 claims that peo-

39 Garret, *Rethinking Genesis*, 14.
40 Albright, *From the Stone Age to Christianity*, 252.
41 Alan Dickin, *A Scientific Commentary on Genesis 1–11*, third edition (Amazon, 2021).

ple "began to call on the name of Yahweh" in the time of Adam, even though Exodus 6:3 explains that the name Yahweh was a new revelation to Moses. Hence, we infer that an older name of God in Chapter 4 onwards was replaced by the name Yahweh. The propensity for people to be named after their gods supports this inference. Thus, no patriarchal names are compounded from Yah, whereas many (including Israel itself) are compounded from the older divine name El. This suggests that the early saga referred to God as El, but this name was replaced by Yahweh as the oral source evolved, in order to demonstrate that the God of the Patriarchs was the same as the God of Moses. Consistent with this kind of informal updating process, over a quarter of the divine names in the dialogue of the Yahwist source still refer to God by the generic name Elohim (a derivative of El), as the original speakers would have done. However, every single divine name in the Yahwist *narrative* has been updated, as we would expect from later narrators.[42]

The usage of divine names in the Priestly source of Genesis is very different: it never uses the divine name Yahweh in dialogue. Based on the argument above, the original speakers could not have used this name, and the written text was evidently never updated. In contrast, the Elohist source, although likewise not recognising the revelation of Yahweh before Moses, nevertheless uses Yahweh three times in dialogue (Genesis 22:15, 28:21, 31:49). This shows that the Elohist tradition underwent partial updating of its dialogue in a similar way to the Yahwist, as we expect for an epic oral source.

Additional evidence for the different evolution of the Priestly and the tribal epic sources comes from the distribution of the phrase "to this day" in Genesis. This expression implies that a source was updated by a narrator who was looking backwards to an earlier time. It is characteristic of an oral narrator who is contemporary with his audience. Hence, the phrase is found six times in the J/E sources in Genesis (19:37, 22:14, 26:33, 32:32, 35:20, 47:26), but never in the Priestly source. Again, this is indicative of a written source that was not being editorially updated.

42 Friedman, *The Bible with Sources Revealed*, 11.

Further evidence for the different evolutionary histories of the Priestly and epic tribal sources comes from the variable degree of continuity in their narratives. For example, Richard Friedman argued that the Yahwist source can be fully reconstructed to provide a nearly complete history, as demonstrated by his *Hidden Book in the Bible*.[43] And although the Elohist source does not begin until Genesis 12, it is afterwards relatively coherent as a history.[44] In contrast, it has often been recognised that the Priestly source (when extracted from the Pentateuch as a separate document) is relatively incoherent as a historical narrative.[45] For example, the Priestly part of the Flood story notes the sinfulness of humanity, but since P lacks any account of the Fall, we do not understand how humankind's sinfulness arose.

However, expecting a coherent story from the Priestly source is a misunderstanding of its character. Its coherence comes from its *genealogical* continuity, based on its *toledot* statements ("these are the generations of"). This structure was so strong that the later redactor used it as the fundamental framework for the whole book of Genesis. In turn, the narrative sections of the Priestly source are not principally intended to tell a story, but to preserve important covenants and written agreements that were typically written down, even in the ancient world. These texts include the divine covenants of Genesis, but also some legal agreements between purely human parties (Genesis 1:26–30, 6:11–22, 9:1–17, 17:1–14, 23:3–19, 28:1–4, 35:9–15, 47:5–12, 49:29–33, 50:12–13).[46]

43 Richard E. Friedman, *The Hidden Book in the Bible: The Discovery of the First Prose Masterpiece* (Harper San Francisco, 1998).

44 Antony F. Campbell and Mark A. O'Brien, *Sources of the Pentateuch: Texts, Introductions, Annotations* (Minneapolis: Fortress Press, 1993).

45 Friedhelm Hartenstein and Konrad Schmid (eds), *Farewell to the Priestly Writing? The Current State of the Debate*, Ancient Israel and Its Literature 38 (Atlanta: SBL Press, 2022), 18.

46 Dickin, *A Scientific Commentary*, 21.

The Direction of Compositional Influence

The above evidence suggests that the Priestly document was only sparingly amended over time, but was *supplemented* by the addition of new episodes. This makes it reasonable that early Priestly accounts could have influenced the writing of later ones, but not vice versa. However, the influence is not necessarily in the direction expected from the "historical" order of the accounts. In other words, rather than the Flood story echoing the story of creation, Genesis 1 itself could have been inspired by the overwhelming experience of the cosmic Flood. And in fact, several lines of evidence suggest that this is the actual direction of compositional influence.

Firstly, the world of chaotic water in Genesis 1 is not an obvious basis for a creation story inspired in Mesopotamia, which is extremely dry for most of the time. The environment of Mesopotamia is captured perfectly by the creation story of Genesis 2, which begins with a world where there was no rain or vegetation, and where the human being was created from dry dust. On the other hand, the world of a Mesopotamian flood is indeed a world in chaos, consisting only of water.

A second basis for creation inspired by the Flood is the origin of light. Thus, one of the oldest enigmas of Genesis 1 is the claim that daylight existed before the sun. To solve this problem, creationists have proposed that the sun's light was blocked for most of earth's history by a long-lived atmospheric vapour barrier. But since no human being was there to see this, the explanation has no philosophical basis. On the other hand, the experience of the Flood suggests that what was being envisaged on Days 2 and 3 of creation was simply the experience of a heavily overcast sky that typically accompanies storms. Under these conditions daylight exists without any glimpse of the sun. This was a relatively rare phenomenon in Mesopotamia, where the sky is generally cloudless.

A third basis for creation out of the Flood is the idea of God separating the waters above and below the sky. Here, modern commenta-

tors have tended to over-interpret the text. For example, Richard Friedman reads too much into the Priestly conception of creation and Flood:

> In the P creation story, God creates a space (firmament) that separates waters that are above it from waters below. The universe in that story is thus a habitable bubble surrounded by water. This same conception is assumed in the P flood story, in which the "apertures of the skies" and the "fountains of the deep" are broken up so that the waters flow in.[47]

By suggesting that the Priestly universe was a "habitable bubble surrounded by water," Friedman is going well beyond the text. Rather than inferring that God made a bubble of air in what was previously solid water, we should simply conclude that God brought an end to a state of incessant rain. The experience of non-stop heavy rain that goes on for weeks or months is quite enough to seem like a return to cosmic chaos, in which the skies are unable to hold back the onslaught of waters from the heavens. To a person who has experienced that state, the end of the rain is apt to seem like a miracle of God. And with the end of incessant rain, those on the Ark were able to hope for the appearance of dry land, which follows on the next day of creation, accompanied by plants that sprout from the ground as if by spontaneous genesis.

When the clouds clear, the heavenly bodies appear as if suspended in the sky. Their installation is the first stage in populating the tiers of the cosmos that are established as chaos is pushed back. These acts of population continue on the fifth and sixth days of creation, just as birds and animls were released from the ark. However, the creation of humanity is unique. Only humankind is made in the image of God (Genesis 1:26), closely paralleling God's covenant with Noah, "for in the image of God has God made humankind" (Genesis 9:6).

The best explanation of all these observations is that the experience of the Flood inspired the Genesis 1 creation story. However, there are two aspects of the account that mark it out as a visionary expe-

47 Friedman, *The Bible with Sources Revealed*, 44.

rience rather than a regular human composition. Firstly, the account is highly oral/aural, claiming that God spoke no less than ten times. Secondly, the account is highly visual, as remarked by the nineteenth century scholar John Kurtz: "The Mosaic record … is improperly called the history of the creation; it should be called a picture of the creation. Every feature of it appears to betray the pencil of the painter, not the pen of the historian."[48] Both of these attributes point to Genesis 1 as a visionary revelation, probably as a series of daily experiences over a period of a week. However, when the priestly recipient translated these experiences into words, he would have expressed them within an ancient prescientific worldview. In other words, God did not reveal an ancient cosmology. He revealed six visions of creation based on the earth emerging from the Flood, but these visions were described by ancient peoples in the context of their perceived cosmology.

Order from Disorder

Given the above argument, it may be helpful to examine the first stages of unfolding creation in more detail, to see how they could have been inspired by the Flood Story. For example, it was already pointed out that the second creation story begins with "not-yet" statements that embody a kind of timelessness and formlessness that typically introduces ancient near-eastern (ANE) origins stories. However, the Genesis 1 and Genesis 2 creation stories deal with this formless state in different ways. In the anthropomorphic account of Genesis 2, God acts as an artisan to create order, whereas the more impersonal account of Genesis 1 describes acts of cosmic *separation* which create order. We will therefore examine each of the acts of divine separation to see how they resolve the disorder exemplified by the cosmic Flood.

48 Quoted from Andrew J. Brown, *The Days of Creation: A History of Christian Interpretation of Genesis 1:1–2:3*. (Leiden: Brill, 2019), 245.

Day One

The first of these acts involves the creation of light on Day 1 (Genesis 1:3). This verse often leads modern readers to equate the creation of light with the Big Bang. However, Walton argued that we must dispense with our modern understanding of light as electromagnetic radiation in order to take the intention of the ancient author seriously.[49] Arguing that to the ancient author, "light" and "day" were synonymous, Walton suggested that it was actually *daylight* that was the first created thing, not the Big Bang. Hence, in verses 4 to 5, "God saw that the light was good, and he separated the light from the darkness. God called the light 'day' and the darkness he called 'night'."

Walton argued that rays of light cannot be separated from darkness, so it was the *duration* of light that was separated from darkness.[50] Hence, he suggested that time itself was created on the first day.[51] However, there seems little basis in the text for this interpretation, which appears to depart from the ANE concept of beginnings on an indeterminate "faraway day," and instead reads Greek philosophical ideas of beginnings into the text. Nevertheless, we can still understand Genesis 1 as describing the creation of periods of day and night if we see day and night emerging from a previously disordered state in which the *passage* of time was unmarked. For example, if day and night were created from a previous disordered state of darkness (Genesis 1:2), we need to understand the relationship between this preexistent darkness and the creatively separated night of Genesis 1:5. To clarify this issue, we need to examine the breadth of meaning of the Hebrew word for darkness (*choshek*) in the Old Testament.

In Genesis 1, the word *choshek* is used four times—once to describe the preexistent darkness of verse 2, and three times to describe night (verses 4, 5, and 18). However, the majority of uses in the Old Testament refer to what we might call "indeterminate darkness." For

49 John H. Walton, *Genesis: The NIV Application Commentary* (New York: Zondervan, 2001), 79.
50 Walton, *Genesis*, 79.
51 Walton, *Genesis*, 79; Walton, *The Lost World of Genesis One*, 56.

example, six usages refer to darkness caused by extremely dark clouds during the daytime. These include heavy rainclouds (2 Samuel 22:12; Psalm 18:11; Zephaniah 1:15) or the cloud that covered Mount Sinai at the giving of the law (Deuteronomy 4:11; 5:23). Three other usages refer to the plague of darkness in Egypt, which resulted in darkness during the daytime (e.g., Exodus 10:22; Psalm 105:28). Other examples are the darkness of a mine (Job 28:3) and the shadow of death (Job 10:21). These usages confirm that *choshek* can mean night, but they show that it can also describe an indeterminate state of darkness where daytime and nighttime cannot be distinguished. This kind of indeterminate darkness is what would have been experienced during the intense storm of Noah's Flood, thus inspiring the description in Genesis 1:2. In contrast, the creation of light in Genesis 1:3 describes the first clearly defined day, after the chaos of the storm has been brought to an and.

Day Two

Similar principles can be applied to understand the strange act of separation on Day 2 of creation, between the waters above and below the sky. To understand this act of separation properly, we again need to re-examine the state described in Genesis 1:2. Here, we read of the "wind of God" sweeping over the face of the dark waters; but what exactly were these dark waters?

If we follow the geometry of Friedman quoted previously, God made a bubble on Day 2, in what was previously solid water. But in that case, the wind of God was blowing over the face of some unknown waters that were a few thousand feet above the earth's surface. This may make sense to the modern technical mind, but to the ancient audience it would have been absurd. Instead, they would have conceived that the wind of God was blowing over the same watery surface that would later form the sea.

The difference between the primeval waters and the later sea is that during the Flood, the space between the heavens and the watery earth was also "full" of water. Not solid water exactly, but a chaotic mix-

ture of air and water that resembles water, just as the chaotic mixture of light and darkness during the chaos of the Flood was more-or-less like darkness. Hence, the creative act on Day 2 involved constraining the chaotic waters that were filling the air behind a solid structure, described by the Hebrew word *raqia*.[52] This word is best translated as in the NRSV: "And God said, 'Let there be a dome in the midst of the waters, and let it separate the waters from the waters'" (Genesis 1:6).

This use of the word "dome" is consistent with the derivation of *raqia* from the verb "to hammer out a metal sheet" (Exodus 39:3), and is supported by the more detailed description in Job 37:18, where the heavens are described as "hard as a mirror of cast bronze" (NIV). This phrase in Job is intended as a literal description of the sky, and is not a spiritual metaphor. This nonscientific understanding of the dome of the sky is confirmed by the placing, on Day 4 of creation, of the heavenly lights "in the dome of the sky" (Genesis 1:14, NRSV). In other words, the sun, moon, and stars were conceived of as located *below* the upper waters. This nonscientific view of reality can be understood as a human *interpretation* of the God-given vision of creation, rather than a divine "accommodation" of humankind's simplicity within the vision itself.[53] In other words, the visions of creation were inspired by re-creation after the Flood, but their actual substance did not contradict physical principles.

Days Three and Four

The second act of constraining the cosmic waters (Day 3) involved God hemming in the waters below the sky to form the sea, a realm of chaos that will be excluded from the new earth (Revelation 21:1). Again, the context of the Flood helps us to better understand the creative separation of the third day. The brown colour of floodwaters shows that they

52 Paul H. Seely. "The firmament and the water above," *The Westminster Theological Journal* 53 (1991): 227–240.

53 Paul H. Seely, "Genesis 1–11 in the Light of Its Second Millennial Worldview: A Response to Carol Hill's Worldview Alternative," *Perspectives on Science and Christian Faith* 60:1 (2008): 44–48.

represent a chaotic mixture of water and earth, but more-or-less like the sea. (The Flood had the appearance of an inland sea that covered Mesopotamia.) When God separates the components of these chaotic waters, we obtain dry land on one hand and sea on the other. This sea that remains after the Flood is clear, not brown. Although it is a realm of chaos relative to dry land, its population with sea creatures operating under God's blessing (Genesis 1:22) shows that the degree of chaos has been markedly reduced compared with the primordial state of the earth in Genesis 1:2.

The dry land that emerges from the waters is commanded to bring forth plants, which were evidently regarded as *part* of the earthly environment, in contrast to the animals that will later populate it. It is notable that the description of plants focuses particularly on their fruits and seeds that will function as food sources, in anticipation of the creation of animals and humanity.[54]

The chaotic mixture of states in the primeval earth having thus been separated into distinct ordered domains, these realms are populated on days 4–6, emphasising the cultic significance of the space. Walter Vogels pointed out that the creation of the heavenly "lights" in Genesis 1:14–18 is a complex process involving God first planning, then making them, then placing them in position. A specifically liturgical function is implied by their description as markers of the (liturgical) calendar.[55] These lights also seem to inspire the lamps of the tabernacle described in Exodus (27:20–21). The pre-Mosaic revelation of Genesis 1 proposed above makes it unlikely that the influence was in the opposite direction.

Spiritual Intensification in the Creation Story

One might wonder why God would have used the experience of the Flood as the basis for a series of visions revealing the story of creation. I suggest that this was due to the spiritual intensification achieved by

54 Walton, *Genesis*, 113.
55 Vogels, "The Cultic and Civil Calendars."

using the overwhelmingly powerful experience of the Cosmic Flood as inspiration. As an analogy, we can consider the process of intensification that occurs when a natural scene is captured by an impressionist painter. One of the strongest exponents of this technique was the Canadian (Group of Seven) landscape painter Lawren Harris, who intensified the spiritual qualities of his paintings by emphasising the dramatic qualities of the northern landscape.[56]

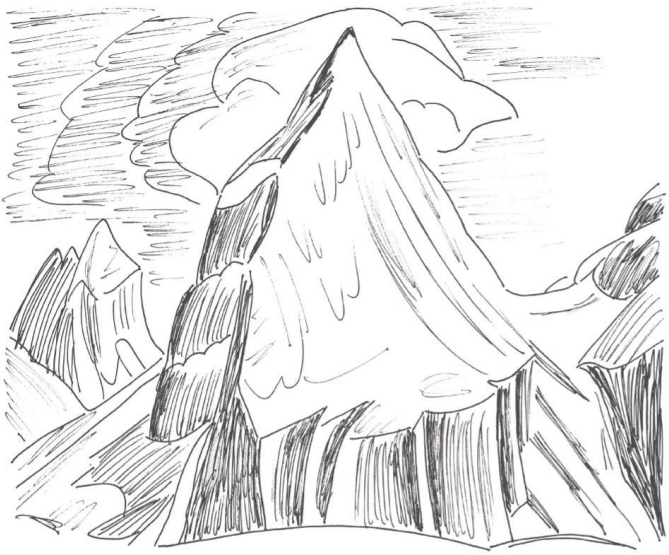

Figure 2. Pen-and-ink rendition of a graphite sketch by Lawren Harris, in preparation for his major oil painting *Mt. Lefroy* (ca. 1930). Original in the McMichael Canadian Art Collection.

For example, Figure 2 shows a preparatory sketch for Harris' major canvas *Mount Lefroy*. The sketch demonstrates an exaggeration of the height of the peak, compared with the real world, and its setting against a numinous cloud. This technique allowed Harris to create powerful

56 B. Harris and R. G. P. Colgrove (eds), *Lawren Harris* (Toronto: Macmillan of Canada, 1976).

and even ethereal expressions of the spirituality of the natural world.[57] The dramatic experience of the Flood would likewise have provided inspiration for the creation story that was grounded in historical reality, but at the same time captured the essence of God's creative power with unsurpassed spiritual intensity.

Genesis 1 as True Myth

Because the Genesis 1 creation story is both historically grounded, and at the same time artistically expressed, it brings together two deep human needs—of truth-telling and storytelling. In the modern world, these human needs often appear to be in conflict, since storytelling is generally associated with fictional works, whereas truth-telling is associated with coldly rational environments such as the law-courts and scientific journals.

In the ancient world, these genres were not so rigidly separated, since there was an intermediate genre that we call Myth. This word is derived from the ancient Greek word *muthos,* which to them simply meant a story. In its modern sense, the word has come to mean a fictional story that can nevertheless convey truthful principles. This suggests that mythology can be a useful vehicle for bridging the gap between storytelling and truth-telling, but it also raises awkward questions. Can deep truths about the human condition be grounded in fictional stories?

Two twentieth-century scholars of Medieval English literature, C. S. Lewis and J. R. R. Tolkien grappled with these issues more intensely than most others. For example, Lewis expressed his frustration about the gap between truth and myth as follows:

> The two hemispheres of my mind were in sharpest contrast. On the one side a many-islanded sea of poetry and myth; on the other a glib and shallow "rationalism." Nearly all that I loved I believed

57 A. Davis, *The Logic of Ecstasy: Canadian Mystical Painting, 1920–1940* (University of Toronto Press, 1992), preface.

> to be imaginary; nearly all that I believed to be real I thought grim and meaningless.[58]

Here, Lewis testifies that mythology connected with him on an emotional level that rational explanations of reality failed to match. However, Tolkien argued that the life of Jesus was a True Myth that could bridge the gap between mythology and rationalism, an idea that eventually led Lewis to faith in God.[59] Furthermore, Tolkien believed that the realities expressed by True Myth could have a deeper meaning than a rational account.[60] He convinced Lewis of this assertion, leading Lewis to express the value of True Myth as follows:

> In the enjoyment of a great myth we come nearest to experiencing as a concrete what can otherwise be understood only as an abstraction... When we translate we get abstraction—or rather, dozens of abstractions. What flows into you from the myth is not truth but reality (truth is always *about* something, but reality is that *about which* truth is), and, therefore, every myth becomes the father of innumerable truths on the abstract level. Myth is the mountain whence all the different streams arise which become truths down here in the valley; in *hac valle abstractionis*.[61]

This analysis affirms that Genesis 1 is an example of True Myth, because it reveals the reality of God's creation in a deeper way than rational scientific explanations of origins. In other words, Genesis 1 was never intended to be a scientific account of the origins of the cosmos, and it is a mistake to look for mechanistic concordance between these accounts.

58 Clive S. Lewis, *Surprised by Joy: The Shape of My Early Life* (New York: Harcourt, Brace & World, 1955), 170.

59 Alistair McGrath, "A Gleam of Divine Truth: The Concept of Myth in Lewis's Thought," *The Intellectual World of CS Lewis* (Chichester, UK: Wiley-Blackwell, 2014), 55–81.

60 Richard L. Purtill, *J. R. R. Tolkien: Myth, Morality, and Religion* (San Francisco: Ignatius Press, 2003)

61 Clive S. Lewis, "Myth Became Fact" in *God in the Dock* (Grand Rapids: Eerdmanns, 1998), 66–67.

Even though the physical origins of the universe did not actually occur in the manner described in Genesis 1, I suggest that this True Myth has a real historical basis on two levels. Firstly, it was inspired by a real event (the Flood), which was recognised as a turning point of human history; secondly, it was revealed as a series of visions in a real priestly environment. These visions inspired by the Flood were themselves a sacred *enactment* of creation, so real that they could form the basis for the institution of the Sabbath described in the Fourth Commandment. Because True Myth bridges the gap between truth-telling and storytelling, it forms a solid foundation for biblical revelation. A scientific account of the origins of the cosmos would surely not have achieved the same emotional connection with ancient or modern audiences.

The author reports there are no competing interests to declare.
Received: 19/12/22 Accepted: 06/03/23 Published: 22/03/23

Church Responses and Theological Resources for Technological Addiction

Armand Babakhanian

Abstract: In this paper, I engage work done in philosophy, theology, and addiction science to argue that the church possesses resources for preventing technology addiction. First, I briefly sketch what technology addiction is and provide evidence to suggest that it is rapidly growing. Then, I suggest two causes for the growth of technology addiction: boredom and the desire for a meaningful identity. Third, I discuss two resources that the ancient churches possess to address these two causes. These two resources are the doctrine of divinisation and the sacrament of reconciliation. Fourth, I argue that some Protestant traditions possess similar practices for addressing technology addiction. The significance of my thesis is that the church can help preventing non-addicted people from falling prey to technology addiction.

Keywords: addiction theory; boredom; divinisation; meaningful identity; philosophy; technology

Technology addiction has become an increasingly widespread issue. Addictions to smartphones, the internet, digital pornography, social media, and online gaming have become familiar phenomena in popular culture. The problem only seems to grow as technology becomes

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Armand Babakhanian is a graduate student of philosophy at Georgia State University and a Roman Catholic. He received his Bachelor of Arts in Philosophy from Biola University in 2022. His current areas of interest are in the history of philosophy, philosophy of religion, metaphysics, and theology. The author acknowledges the editors of this journal, Kent Dunnington, and the two anonymous reviewers for their helpful suggestions that led to the improvement of his paper.

a ubiquitous feature of daily life. Concerned Christians might be interested in how the church can respond, which is what I propose to discuss here. I intend to draw upon Christian philosopher Kent Dunnington's work *Addiction and Virtue*[1] and other philosophical literature, theological sources, and addiction science, to argue that the church possesses some helpful resources for the prevention of technology addiction. My intention is not to provide a strategy for addiction recovery.

In addressing this matter, I refer to two causes of technology addiction and suggest two ways the church may stave off the growth of technology addiction among believers. The two causes to which I focus here are boredom and the desire for a meaningful identity. While the web of causation undergirding addiction is undoubtedly complex,[2] I choose to take a more modest and focused approach by homing in on these two specific causes in my paper. I choose to focus on these two specific causes because they seem to be the most directly addressable by the church and its mission. The church could address these causes of technology addiction as follows. First, I refer to the Christian doctrine of divinisation, which can provide a unifying goal that infuses life with enough meaning and purposefulness to prevent boredom. Second, I focus on the sacrament of reconciliation, which provides a way of maintaining a meaningful Christian identity over one's lifespan. The church employs these tools as integral to fostering Christian koinonia or fellowship. In this light, what I propose is that Christians do not have to feel powerless in the face of the growing problem of technology addiction, and that they are already in possession of some helpful resources for preventing it. Another implication of my paper is that, from this viewpoint, Christians have another reason to be more eagerly involved in the church and to invite others into the church, namely, for the purposes of avoiding boredom, maintaining a meaningful identity, and avoiding technology addiction. To be clear, my claims and argu-

1 Kent Dunnington, *Addiction and Virtue: Beyond the Models of Disease and Choice*, Strategic Initiatives in Evangelical Theology (Downers Grove, IL: InterVarsity Academic, 2011).

2 See Bruce Alexander, *The Globalization of Addiction: A Study in Poverty of the Spirit* (New York: Oxford University Press, 2010), ch. 1.

ments are not based on any clinical trials, surveys of practitioners who work on addiction recovery, surveys of recovered addicts, or other empirical research. My aim is primarily conceptual and theoretical, and meant to inspire further research into addiction prevention. I chose to focus on the Roman Catholic and Orthodox traditions because the two resources I engage with are most readily available in these traditions. However, as I will argue, some Protestant traditions are also open to these resources.

What is Technology Addiction?

Addiction is a concept that is difficult to define in regard to outlining the necessary and sufficient conditions which constitute it. Technology addiction is even more difficult to define because of its relatively recent appearance. It has not received nearly as much attention in the scientific literature as more traditional forms of addiction, such as alcoholism or other forms of substance use addiction have. Nonetheless, there are some core features which typically characterise technology addiction with sufficient accuracy for present purposes.

Technology addiction is a kind of behavioural addiction. What distinguishes a technology addiction from other behavioural addictions is that its object is a technological device or an associate process, such as a smartphone, a website, or an app. For example, technology addiction includes addiction to social media, digital pornography, smartphone, online gaming, and online auction. The most obvious characteristics of technology addiction are: unsuccessful efforts to stop behaviours, cognitive salience, use for mood regulation, withdrawal symptoms, tolerance, and use despite knowledge of negative consequences.[3] There is no clear line of demarcation between a troublesome habit and addiction proper. Nevertheless, if one exhibits increasingly more characteristics of technology addiction with respect

3 Petros Levounis and James Sherer, *Technological Addictions* (Washington, DC: American Psychiatric Association Publishing, 2022), 34–35.

to some device or process, it becomes increasingly likely that one has a technology addiction.

Rates of technology addiction and problematic technology use have grown uncomfortably high. For example, it is estimated that approximately 3–6% of American adults are addicted to digital pornography, approximately 10% of Americans are addicted to social media, and nearly half of them consider themselves "addicted" to their smartphones.[4] Countries such as China and Japan have instituted laws that limit the amount of access people have to online gaming and the internet in general.[5] Popular books and films have been produced such as Nicholas Carr's *The Shallows*,[6] Adam Alter's *Irresistible*,[7] Johann Hari's *Stolen Focus*,[8] and the Emmy-nominated film *The Social Dilemma*.[9]

Christians have begun to take notice of the harmful impact of obsession with technology on our spiritual lives and personal relationships with God.[10] They worry that the heavy use of technology keeps us distracted from God, forgetful of our spiritual goals, and distant from Christian fellowship. Some negative consequences of the heavy use of technology are an increased likelihood of depression, anxiety, lone-

4 Levounis and Sherer, *Technological Addictions*, 37; Trevor Wheelwright, "2022 Cell Phone Usage Statistics: How Obsessed Are We?" *Reviews* (24 January 2022), https://www.reviews.org/mobile/cell-phone-addiction/ (accessed 20 April 2023).

5 Sofia Brooke, "What to Make of the New Regulations in China's Gaming Industry," *China Briefing*, https://www.china-briefing.com/news/what-to-make-of-the-new-regulations-in-china-online-gaming-industry/ (accessed 16 November 2021); Ben Dooley and Hikari Hida, "A Government in Japan Limited Video Game Time. This Boy Is Fighting Back," *New York Times*, https://www.nytimes.com/2020/06/11/business/japan-video-games.html (accessed 11 June 2020).

6 Nicholas Carr, *The Shallows: What the Internet Is Doing to Our Brains* (New York, NY: W. W. Norton & Company, 2011).

7 Adam Alter, *Irresistible: The Rise of Addictive Technology and the Business of Keeping Us Hooked* (New York, NY: Penguin Press Publishing, 2011).

8 Johann Hari, Stolen Focus: *Why You Can't Pay Attention – and How to Think Deeply Again* (New York, NY: Crown Trade, 2023).

9 *The Social Dilemma*, directed by Jeff Orlowski (Argent Pictures, 2020), 1:33:42. https://www.netflix.com/watch/81254224.

10 Eliza Huie, "Screen Abuse: An Acceptable Addiction," Biblical Counseling Coalition (26 July 2019), https://www.biblicalcounselingcoalition.org/2019/07/26/screen-abuse-an-acceptable-addiction/ (accessed 10 March 2023).

liness, and other health aspects.[11] Studies show that smartphone use contributes to a decline in social skills, less self-control, emotional instability, and an increased difficulty of making friends.[12] Other studies show that a heavy consumption of digital pornography negatively impacts social and romantic relationships, contributes to social anxiety, and entertains distorted views of sexuality.[13] It is noteworthy, moreover, that Christian traditions teach that the production, distribution, and consumption of pornographic material is a matter of grave sin. Sadly, the problem seems to only grow as technology becomes a ubiquitous feature of our daily lives.

As I have already pointed out, in what follows I present two causes of technology addiction. I do not mean to say, however, that technology is exclusively harmful, and that Christians must turn into Luddites. Obviously, technology has enhanced the quality of our lives in innumerable respects. However, we should seek to minimise the negative effects of excessive use of technology, whatever they may be, as much as possible.

Cause #1: Boredom

One cause of technology addiction is boredom. The kind of boredom I am referring to is the existential boredom which involves the condition of lacking a unifying *telos* that ultimately justifies one's choices and actions. This kind of boredom is related, but distinct from the more colloquial sense of boredom, which usually refers to a temporary lack of excitement, interest, or motivation. When one is bored in this sense, life lacks any ultimate goal that gives one's actions a meaningful "point" and definite direction. Modern societies are uniquely susceptible to boredom because they are highly compartmentalised. Modern

11 Levounis and Sherer, *Technological Addictions*, 108.

12 Jean M. Twenge and W. Keith Campbell, "Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study," *Preventative Medicine Reports* 12 (2018), 217–283, DOI: 10.1016/j.pmedr.2018.10.003.

13 Naomi Brower, "Effects of Pornography on Relationships," Utah State University Extension (April 2023), https://extension.usu.edu/relationships/research/effects-of-pornography-on-relationships (accessed 22 April 2023).

societies lack stable and unifying social structures to offer an overarching point to people's lives. Dunnington writes:

> As the lives of modern persons are fragmented by the partitioning off of work from leisure, of the public from the private, of the religious from the secular, of the young from the old, of the local from the national, and so on, it becomes increasingly difficult to imagine how the activities and commitments of an individual life can amount to an ordered whole. Modern persons who are spread thin by their disparate and disconnected responsibilities desire some unifying principle that can supply integrity in the place of compartmentalization and fragmentation.[14]

Modern societies value pluralism, individual liberty, and self-expression. While commendable in important respects, these values come at the cost of parsing apart various dimensions of human life from each other for the sake of personal independence. The atomisation of modern society makes it difficult for modern folks to see how all the facets of life come together to form a coherent unit aimed at a choice-worthy goal.

Some addiction theorists suggest that addiction can be a response to boredom.[15] As Frank Schalow writes,

> Boredom points to a preliminary disclosure of the mundaneness of our everyday situation which impels us, as if seeking an "escape," to shift our attention to the "excitement" provoked by individual things. In the case of technology, where the "instant" offers the greatest fascination, the excitement of such mundane activities, e.g., "computerized war-games" (e.g., as a special genre of video-games), becomes especially pronounced. Although experienced as a possible escape from boredom, the excitement and allure of technology still confirms the power of indifference as casting its spell over anything.[16]

14 Dunnington, *Addiction and Virtue*, 117.
15 Dunnington, *Addiction and Virtue*, 117–118.
16 Frank Schalow, *Toward a Phenomenology of Addiction: Embodiment, Technology, Transcendence* (Springer, 2017), 101.

Technological devices are simply a more effective and accessible object of addiction than other substances and behaviours for those who are trying to escape boredom. Technological devices are well-suited as "distractions" because of how easily accessible and ubiquitous they are.

Additionally, many technological devices and processes like frequenting social media and digital pornography release abnormally high amounts of the brain's reward neurochemical dopamine.[17] Dopamine is released as a way of incentivising productive activities and can help form neural networks which habituate the person to engage in those activities.[18] However, the reward-system can be "hijacked," as when the brain is repeatedly exposed to abnormally large releases of dopamine while engaging in harmful behaviours. This makes many technologies more attractive distractions than non-technological behaviours such as physical exercise, board games, or conversations with others. While the specific way that boredom may be related to specific kinds of technology addiction, like online gambling or pornography, boredom can play a more general role in rendering people vulnerable to addiction. So, the growth of technology addiction may be seen as partly caused by the modern condition of boredom.

Cause #2: Desire for a Meaningful Identity

The desire for a meaningful identity amounts to aspiring to foster an identity that is grounded in community and ordered towards an end. Some addiction theorists describe this phenomenon as a desire for psychosocial integration. According to psychologist and addiction theorist Bruce Alexander, psychosocial integration is—

17 Min Liu and Jianghong Luo, "Relationship between peripheral blood dopamine level and internet addiction disorder in adolescents: A pilot study," *International Journal of Clinical and Experimental Medicine* 8:6 (2015): 9943–9948.

18 Ethan S. Bromberg-Martin, Masayuki Matsumoto, and Okihide Hikosaka, "Dopamine in Motivational Control: Rewarding, Aversive, and Alerting," *Neuron* 68:5 (2010): 815–834, https://doi.org/10.1016/j.neuron.2010.11.022.

> a profound interdependence between individual and society that normally grows and develops throughout each person's lifespan. Psychosocial integration reconciles people's vital needs for social belonging with their equally vital needs for individual autonomy and achievement.[19]

Alexander claims that psychosocial integration is often experienced as a sense of social identity, a oneness with nature, or a connection to the divine.[20] Alexander argues extensively that addiction is a social phenomenon that emerges as a response to a sustained loss of psychosocial integration or "dislocation." He provides ample evidence to show that many people are in a condition of "dislocation," that is, alienated, uprooted, and disconnected from sources of social belonging such as community, tradition, and religion. One piece of evidence is the case of addiction amongst Canadian aboriginal people after the advent of British colonisation, disruptive Canadian government measures, and British cultural influence. Alexander writes:

> Although some Canadian natives developed a taste for riotous drunkenness from the time that Europeans first introduced alcohol centuries ago, most individuals and tribes abstained, drank only moderately, or drank only as part of tribal rituals as long as they maintained an intact tribal culture. It was only during periods of cultural disintegration that alcoholism emerged as a universal, crippling problem for native people … Eventually, every tribal culture in Canada was broken down by the overpowering European culture, and every tribe succumbed to addiction and other ravages of dislocation. Universal dislocation produced nearly universal addiction. Addiction among Canadian natives has not been limited to alcoholism. It has kept pace with the times as addictions to the latest drugs, gambling, television, and video games have been added to the list. The causal relationship between dislocation and addiction has been apparent from the start.[21]

19 Alexander, *Globalization of Addiction*, 58.
20 Alexander, *Globalization of Addiction*, 58.
21 Alexander, *Globalization of Addiction*, 134.

A second piece of evidence which Alexander mentions is that addiction often is an adaptive function which provides "substitute communities" in place of psychosocial integration. This is also apparent in the case of technology addictions to video games, digital pornography, and the internet. Alexander writes, "The Internet has an enormous capacity to enhance the illusion of interactivity at low cost to the merchant, and thus can provide highly profitable mass substitutes for psychosocial integration. Therefore, it can serve an addictive function very well."[22]

Dislocation and the loss of a meaningful identity is widespread in modern societies because of the destabilising social effects of free market economies, the growth of secularism, the regular movement of people/groups around the world, and other social transformations. Modern people are uniquely susceptible to being left "afloat", without stable and meaningful identities, and without a unifying *telos*. In traditional premodern societies, people possessed a "teleological" sense of life because they were integrated into tightly-knit social networks.[23] Folks had their identities shaped and shared alongside their family, friends, faith, authorities, and broader community. People were born into their identities as Christians, carpenters, Romans, or nobles. People occupied a social role within their respective social order which was not entirely self-determined. Their social roles or "functions" were accompanied by ends and justifications for their actions, as indispensable members of a larger social organism. One ought to farm because one was a farmer, one ought to pray because one was a Christian, and one ought to rule because one was a nobleman. Alasdair MacIntyre writes:

22 Alexander, *Globalization of Addiction*, 168.

23 Alan Macfarlane, "History, Anthropology and the Study of Communities," Social History 2:5 (1977): 631–632, DOI: 10.1080/03071027708567401; Gemma Blok et al. (eds), *Imagining Communities: Historical Reflections on the Process of Community Formation* (London and New York: Amsterdam University Press, 2018), 9.

> In much of the ancient and medieval worlds, as in many other premodern societies, the individual is identified and constituted in and through certain of his or her roles, those roles which bind the individual to the communities in and through which alone specifically human goods are to be attained; I confront the world as a member of this family, this household, this clan, this tribe, this city, this nation, this kingdom.[24]

MacIntyre describes how premodern people approached the world from within their socio-historical roles as members of a larger group. One's personal identity was inextricably tied to and structured by one's social identity. In premodern societies, the immediate environment was thought to be a part of a larger cosmic order. Social structures, natural objects, and historical events had their place and function within the divinely-ordained universe; the premodern social world is an "enchanted" and theologically-charged world. Charles Taylor elaborates upon this thesis when he writes the following:

> The natural world they [premodern people] lived in, which had its place in the cosmos they imagined, testified to divine purpose and action; and not just in the obvious way which we can still understand and (at least many of us) appreciate today, that its order and design bespeaks creation; but also because the great events in this natural order, storms, droughts, floods, plagues, as well as years of exceptional fertility and flourishing, were seen as acts of God … God was also implicated in the very existence of society (but not described as such—this is a modern term—rather as polis, kingdom, church, or whatever). A kingdom could only be conceived as grounded in something higher than mere human action in secular time. And beyond that, the life of the various associations which made up society, parishes, boroughs, guilds, and so on, were interwoven with ritual and worship … One could not but encounter God everywhere.[25]

24 Alasdair MacIntyre, *After Virtue* (Notre Dame, IN: University of Notre Dame Press, 2008), 172.

25 Charles Taylor, *A Secular Age* (Cambridge, MA: Harvard University Press, 2007), 25.

According to Taylor, premodern people believed that the events in the world were charged with deep religious significance. Physical objects and events were imbued with meaning through their connection to spiritual agents such as God. The natural order was taken to be a grand cosmological structure which was designed by God for certain purposes. The natural order included the social order, such that premodern people believed that their social arrangements and identities were features of God's cosmological architecture. This ingrained sense of one's social role within a deeply spiritual and teleological order conferred a stable and meaningful justification for one's existence, actions, and choices. Of course, some premodern folks must have fallen into boredom. However, premodern people were not very susceptible to boredom because of the stable social structures in place at the time.

On the other hand, modern people are disconnected from traditional sources of identity formation, social cohesion, and social integration. The modern world does not enjoy the same stable social structures as the premodern world did, or as enduring archaic societies do to this day. Thorough secularisation of modern life and the rapid transformations inaugurated by free market capitalism contribute to an environment that is hostile to the characteristically slow and gradual processes of development required for meaningful communal identities. The disentanglement of religion from public societies leaves many people feeling lost, dissatisfied, and without a sense of purpose. Taylor writes that—

> Many young people are following their own spiritual instincts, as it were, but what are they looking for? Many are "looking for a more direct experience of the sacred, for greater immediacy, spontaneity, and spiritual depth," in the words of an astute observer of the American scene. This often springs from a profound dissatisfaction with a life encased entirely in the immanent order. The sense is that this life is empty, flat, devoid of higher purpose.[26]

26 Taylor, *A Secular Age*, 506.

Taylor captures the feelings of deep existential unrest and dissatisfaction many secular modern people have with their newly disenchanted and "purposeless world." The subjugation of social life to economic life produces a similar effect of inducing dislocation. Alexander describes our environment as—

> a "desymbolised" environment, in which the symbolic potency of religion, nationality, intellectual achievement, authority, gender, and race must be discredited in order to make people maximally responsive to continually changing economy. People must be flexible workers and trendy consumers with all their options open.[27]

Alexander offers an economic explanation for the similar phenomena addressed by Taylor and MacIntyre. The destabilisation of community and identity in modern life is partly due to the usual sources of communal identity becoming transformed into mere means for economic ends in modern capitalist societies. Addiction tends to grow as a therapeutic substitute for those modern folks in desperate need of a meaningful identity. The individualistic, disenchanted, and economic structures of many modern societies render meaningful identities unstable and insecure. Of course, none of the above suggests that the transition from medievalism to modernity was a net loss of human wellbeing, and that we should return to a premodern state of affairs. Modern people clearly enjoy numerous goods which those in the medieval era could never have, including technology, and a romantic image of premodern ages that should be avoided.

However, this fact about modernity's many successes does not mean we should ignore uniquely modern issues, such as the prevalence of addiction, and not seek ways of ameliorating them. Addiction often becomes an antidote for people who struggle under these modern structures to form and maintain stable meaningful identities. The particular way that the desire for a meaningful identity may lead to addictions may vary between kinds of addiction. However, it seems to

27 Alexander, *Globalization of Addiction*, 117.

remain the case that the desire for a meaningful identity is a general pressure on people which can push them into addiction. Technology addiction can be understood as just the most recent form of addictive response to the natural human desire for a meaningful identity.

Resource #1: The Doctrine of Divinisation

I argue that the doctrine of divinisation may help the church prevent the growth of technology addiction by counteracting the factors leading to the existential condition of boredom. Divinisation is sometimes also called deification, *theosis*, as well as divine adoption and divine participation. Divinisation is the elevation of the human person, by divine grace, to Godlikeness by way of divine participation. It is the end to which grace orders the human aspirant.

Divinisation is intimated in biblical texts such as 2 Peter 1:4, which reads, "he has granted to us his precious and very great promises, so that through them you may become partakers of the divine nature, having escaped from the corruption that is in the world because of sinful desire." It is a common notion in many patristic authors such as St Irenaeus of Lyon, St Athanasius the Great, and St Maximus the Confessor.[28] Athanasius famously wrote in his *On the Incarnation of the Word*, "For he was made man that we might be made God."[29] Divinisation is also somewhat present in Protestant Reformers such as Martin Luther and theologians in the Lutheran tradition. As one astute theologian notes, Martin Luther preached in a Christmas sermon that, "As the Word became flesh, so it is certainly necessary that the flesh should also become Word. For just for this reason does the Word become flesh, in order that the flesh might become Word. In other words: God becomes man, in order that man should become God."[30] In many Christian theological traditions such as Lutheranism, Roman Catholi-

28 Norman Russell, *The Doctrine of Deification in the Greek Patristic Tradition* (New York: Oxford University Press, 2004), 105, 166, 262.
29 Athanasius, *On the Incarnation* 54.3.
30 Kurt E. Marquart, "Luther and Theosis," *Concordia Theological Quarterly* 64:3 (2000), 186.

cism, and especially Eastern Orthodoxy, divinisation is tied to matters of grace, soteriology, and incarnational theology. Maximus the Confessor summarises the doctrine of divinisation as follows:

> By a gracious adjustment God became man and is called man for the sake of humankind, and by exchanging his condition for ours revealed the power that elevates human beings to God through love for God and brings God down to humankind out of love for humanity. By this blessed inversion, humankind is made God by divinisation and God is made man by hominisation.[31]

Divinisation consists in the elevation of the human being to a Godlike status through participation in God. It is the ultimate end and culmination of the Christian life. Participation in God is made possible through God's incarnation and provision of grace to human beings. Importantly, when human beings are divinised they do not become identical to God or a second instance of God. Divinisation does neither imply a monistic identification between God and creatures nor a polytheistic vision of multiple all-powerful and perfect beings. Instead, it denotes the ennoblement of human beings by a more intimate union between God and God's children.[32]

The doctrine of divinisation can help Christians combat the growth of technology addiction by a unifying *telos* that ultimately justifies one's choices and actions. Divinisation is the ultimate *telos* of the Christian life that infuses one's life with enough meaning and purpose to prevent boredom. The disparate responsibilities and compartmentalised features of modern life cause boredom to everyone, including Christians. It seems difficult to conceive of how one's various activities and projects can be unified into an ordered whole. However, the church is uniquely positioned to offer Christians a unifying *telos* for their life-narrative.

Divinisation is a traditional feature of many theological traditions that present life as amounting to an ordered whole and as being

31 Maximus, *Difficulty* 7.22.
32 Russell, *The Doctrine of Deification*, 109.

endowed with a transformative goal.[33] For these traditions, Christian life ultimately aims at the divinisation of the human person. One's responsibilities, projects, and social relationships reach fulfilment in the supernatural condition of Godlikeness. This is the meaning-giving narrative of the Christian life that justifies one's choices, actions, and experiences. A diverse array of philosophers and theologians, such as the proponents of narrative theology and radical orthodoxy, have already argued extensively that the Christian life ought to be construed in the form of narrative.[34] Brian Ballard argues that—

> Christianity is telling us to adopt a narrative orientation towards our past, both near and far; to be prepared to make verbal and explicit our behaviors; to be highly reflective about the inner life that underwrites those behaviors; and crucially, to bring to bear on this narrating of behavior and inner life the concepts of the gospel—creation, fall, and redemption. Seemingly disparate episodes are thus brought together in a narrative of God's grace and human need.[35]

Christian life is a dramatic story of sin, redemption, growth, and ultimately salvation. In this context, divinisation is the final goal of the Christian individual's life-story. Christian life is structured around achieving this God-ordained end as adopted children of God. The unification and justification of experiences, choices, actions, and relationships originates in one's knowledge of an ultimate destiny and future reward of divinisation. Suffering, work, and social life are all infused

33 Although Russell largely focuses on the Greek tradition in his study of deification, he also notes in an appendix of his work that deification is present in the Syriac tradition and figures prominently in Latin theologians such as St Augustine.

34 Brian Ballard, "Christianity and the Life Story," *Faith and Philosophy: Journal of the Society of Christian Philosophers* 38:2 (2021), 207, DOI: 10.37977/faithphil.2021.38.2.3; Stanley Hauerwas and L. Gregory Jones, "Introduction: Why Narrative?" in *Readings in Narrative Theology: Why Narrative?* ed. Stanley Hauerwas and L. Gregory Jones (Oregon: Wipf & Stock Publishers, 1997), 1–18; James K. A. Smith, Introducing Radical Orthodoxy: Mapping a Post-secular Theology (Grand Rapids, MI: Baker Publishing Group, 2004), 87.

35 Ballard, "Christianity and the Life Story," 210.

with newfound significance by being integrated into a larger story of a deeply Christian drama of struggle, humility, and joy. So, one way that the church can help prevent the growth of technology addiction is by emphasising the role that divinisation can play as the unifying *telos* of the Christian life in order to overcome boredom.

Resource #2: The Sacrament of Reconciliation

I argue that the sacrament of reconciliation, as a suitable means for maintaining a meaningful Christian identity, may prevent the growth of technology addiction. Christian identity is a helpful buttress against dislocation and boredom, contributing to a meaningful identity. However, a meaningful Christian identity is difficult to maintain for several reasons. One reason is the reality of sin in the Christian life. Part of what it is to be a Christian is to be someone who seeks after God, desires spiritual growth, engages in charitable works, etc. When Christians sin, an inner psychic tension between their self-conception as virtuous and their personal history intensifies, inducing a harmful fragmentation of their identity.[36] It is as though they lead a "double-life," which may lead them to despair over their condition, overwhelmed by self-deception, guilt, or shame. They require reconciliation to God and the church to fully restore the integrity of their Christian identity. Many Christians have experienced this tension or fragmentation. Some have become increasingly susceptible to addiction as a deceptive means of self-therapy. This is so given that people aspire to an integrated and meaningful identity, and it has been shown above that the otherwise legitimate desire for a meaningful identity can sometimes lead to addiction. Psychic disunity leads them to seek harmful addictive objects as ways of finding a meaningful identity.[37] This kind of vulnerability to addiction

36 Aaron B. Murray-Swank, Kerry M. McConnell, and Kenneth I. Pargament, "Understanding spiritual confession: A review and theoretical synthesis," *Mental Health, Religion & Culture* 10:3 (2007), 278–279, https://doi.org/10.1080/13694670600665628.

37 Dunnington, *Addiction and Virtue*, 117.

increases because of the shame that accompanies sin and determine people to avoid the appropriate paths to reintegration.

The sacrament of reconciliation is able to help Christians resolve psychic tension and fragmentation by absolving sins, thereby enabling them to live out their life-story in a way that exhibits consistency and a fruitful direction.[38] The sacrament contributes to the maintenance of their meaningful identity, by weaving the Christian's past sins into their life-story in a redemptive manner, leaving them hopeful and confident about the future. It enables Christians to "move forward" and not be weighed down by their personal history of sin. Upon receiving absolution and completing one's penance, in Catholic parlance, Christians realise that they are no longer tied to a sin-marred past.[39] The psychic tension between Christian identity and personal sins is thus resolved.

Addiction researchers have argued that this process of narrative reconstruction is an important part of addiction recovery. Apart from testimonials given by addicts, Dunnington mentions evidence from neuroscience that addicts have a difficulty with tying their past and future into a coherent life story. He writes that "addicts typically display a neurological disconnect between those parts of the brain that are responsible for linking the past to the future in the form of a personal narrative."[40] Dunnington describes a process of self-construction in the case of addiction recovery as "the humble reconstitution of the self."[41] He attributes the success of traditional Twelve Step Recovery programmes (TSR) to its ability to reconstruct the self of the addict in a way that properly integrates their addicted past with their future of recovery. Dunnington writes, "In my view, TSRs work because the spiritual practices they set forth enable addicted persons to discover that there is a way of connecting their past and their future into a cohesive narrative, despite the fact that their lives have been marred by shame,

38 Ballard, "Christianity and the Life Story," 209–211.
39 Murray-Swank et al., "Understanding spiritual confession," 280–281.
40 Kent Dunnington, "Recovery and the Humble Reconstitution of the Self," *Perspectives on Science and Christian Faith* 70:4 (2018), 242, https://www.asa3.org/ASA/PSCF/2018/PSCF12-18Dunnington.pdf.
41 Dunnington, "Recovery," 242.

guilt, trauma, and failure."[42] In the same vein, addiction researchers Doug McConnell and Anke Snoek write that—

> Addicted people often disvalue aspects of their established self-narratives, especially in long-running addiction … these established self-narratives undermine self-governance by making recovery-directed narratives feel alien and seem implausible. Consequently, many addicted people would benefit if they received support for the narrative work required to connect their established self-narratives with recovery.[43]

Importantly, these self-narratives must be accurate enough to not stand against evidence, but also must be hopeful enough to encourage transformation and recovery. McConnell and Snoek write:

> Narrative projection, particularly in self-transformation, is an imaginative enterprise that requires the agent to narrate beyond known truths. An addict doesn't know if he or she can recover and the addict often has plenty of evidence that suggests he or she can't. When we asked one interviewee where he saw himself in one year's time, he replied, "Probably at the exact same spot as where I am now" (living a lonely life in a deteriorated house). In light of the statistics, this is a realistic narrative projection but it will not help him change his situation. A more ambitious narrative less constrained by known truths would be more helpful in realizing a truth worth living.[44]

From a Christian perspective, while encouraged, one's ambitious narrative is not constrained by known truths about the addicted self. It is theologically correct to believe that the Christian's salvific destiny also

42 Dunnington, "Recovery," 250.

43 Doug McConnell and Anke Snoek, "The Importance of Self-Narration in Recovery from Addiction," *Philosophy, Psychiatry, and Philosophy: John Hopkins University Press* 25:3 (2018), 41, DOI 10.1353/ppp.2018.0022.

44 Doug McConnell and Anke Snoek, "Narrating Truths Worth Living: Addiction Narratives," *AJOB Neuroscience* 3:4 (2012), 78, https://doi.org/10.1080/21507740.2012.721459.

makes addiction recovery possible. The Christian and the scientific approaches complement each other.

In addition to the above, and in tune with my earlier proposal, I claim that the sort of narrative self-reconstruction involved in the sacrament of reconciliation may be a suitable means for altogether *preventing* some of the conditions that leave Christians vulnerable to addiction. Participation in the sacrament of reconciliation provides concrete evidence to Christians that they have been forgiven for the sins which are creating psychic tensions and self-fragmentation; in so doing, it helps maintaining a meaningful Christian identity over time. This sacrament and the associated practices are a significant resource that the church possesses for responding to the growth of technology addiction. The church can emphasise reconciliation and narrative self-reconstruction as one facet of Christian communal life or *koinonia*.

Corresponding Means in Protestantism

The two resources for the church's response to the growth of technology addiction seem to be available only to the Roman Catholic and Orthodox churches. The sacrament of reconciliation is inherent to the Catholic and Orthodox traditions, Eastern and Oriental alike.[45] However, Protestant traditions do not include a sacrament of reconciliation as a part of their theology. Likewise, divinisation is a central feature of the Orthodox tradition and is sometimes referred to in Catholic thought. Although divinisation is not necessarily rejected by the Protestant traditions, it is not a point of emphasis. Given these facts, it seems that my two proposals are inapplicable to Protestant Christians. However, this conclusion is not entirely true. Some Protestant traditions utilise very similar practices which can be used to respond to technology addiction.

45 There are two major Orthodox families, Eastern and Oriental. The Eastern Orthodox family includes churches such as the Bulgarian, the Greek, the Romanian, and the Ukrainian ones. The Oriental Orthodox tradition includes the Armenian Apostolic Church, the Coptic Orthodox Church, the Ethiopian Orthodox Church, etc.

First, certain branches of Protestant theology are open to the doctrine of divinisation and there seems to be no in-principle opposition to the doctrine of divinisation. Divinisation, understood as the elevation of the human being by grace to a Godlike status through divine participation, is not incompatible with the classical theology of the Reformation. As previously mentioned, divinisation has its roots in Scriptures such as 2 Peter 1:4, Psalm 82:6, 2 Corinthians 3:17–18, and John 10:33–36. Additionally, the doctrine of divinisation is present in Martin Luther's thought and alive in the later Lutheran tradition. A range of Lutheran theologians and scholars have made attempts at resurrecting the doctrine of *theosis* or "Christification" in contemporary theology.[46] Furthermore, eminent Episcopal theologians such as William Porcher DeBose have espoused views that are very similar to the doctrine of divinisation.[47] Therefore, Protestantism is at least open to this ancient Christian doctrine, and some Protestant traditions already teach and embrace divinisation as integral to the Christian narrative of salvation.

Second, Protestant traditions have always emphasised the importance of confessing sins to God. Brian Ballard, a Protestant philosopher, writes that—

> Christian morality requires contrition and confession, both of which narrate the believer's life. For, contrition requires narrative representation of one's acts as sinful. And confession should be understood—in the typical case—as verbal and habitual, making explicit the narrative of one's past about which one feels contrition. And since confession is habitual, it thus involves the believer in narrating many events of her life, including her inner life.[48]

46 Jordan Cooper, *Christification: A Lutheran Approach to Theosis* (Eugene, OR: Wipf and Stock, 2014), ix–x.

47 Dan Edwards, "Deification and the Anglican Doctrine of Human Nature: A Reassessment of the Historical Significance of William Porcher DuBose," *Anglican and Episcopal History* 58:2 (1989), 200, https://www.jstor.org/stable/42610327.

48 Ballard, "Christianity and the Life Story," 213.

Additionally, the practice of mentioning one's sins to fellow believers for the sake of transparency, for supplicatory prayers on their behalf, or for help in fighting against their temptations to sin, does exist in Protestant traditions. This practice has biblical roots in James' epistle which reads, "Therefore confess your sins to each other and pray for each other so that you may be healed. The prayer of a righteous person has great power as it is working" (James 5:16 ESV). There is a clear biblical injunction to speaking with brothers and sisters in Christ about one's sins for the sake of spiritual edification.

In this light, many Protestant traditions are at least *open* to this practice. Importantly, many of the relevant psychological effects that occur in the sacrament of reconciliation would likely also be present in this practice. A Christian who experiences inner psychic tension and fragmentation would likely experience a deep sense of relief upon finally confessing one's sins to a good friend, church elder, or pastor. Hopefully, the accompanying encouragement, affirmation, and assistance which would follow such a confession can help Protestant believers reintegrate their past history with a positive vision of their future. Regardless of how much practices of reconciliation might differ across the traditions, Protestants are certainly able to emphasise the practice of confessing sins to other believers for the purposes of edification and the social dimension of confessing sins to other believers. Strictly speaking, there is no Protestant theological principle which would necessitate the rejection of this practice.

All in all, my two proposals for how the church may respond to technology addiction seem to find resonance with Protestant Christians, in theory and in practice.

Conclusion

We have seen above that technology addiction is partly caused by boredom and the desire for a meaningful identity. The church can combat the growth of technology addiction in two ways. First, the church can emphasise the role that divinisation can play as the unifying *telos* of the

Christian life to solve the problem of boredom. Second, the church can recommend the sacrament of reconciliation—or a non-sacramental Protestant equivalent—as a suitable means for maintaining a meaningful Christian identity over the course of one's life. Both factors are an integral part of Christian *koinonia* or fellowship. Although these tools alone do not guarantee addiction prevention, they are nevertheless two resources whose deployment is affordable and worthwhile, since they already are in the church's possession. While these two responses are most readily available to the Roman Catholic and the Orthodox Christian traditions, relevant correspondents are found in certain Protestant traditions.

Christians do not have to feel dejected before the rising tide of technology addiction; their church communities already possess resources which may help prevent vulnerability to and addiction to technological means. This evidence highlights the church as a potential bulwark against some uniquely modern issues which Christians and non-Christians alike face.

The author reports there are no competing interests to declare.
Received: 03/01/23 Accepted: 13/04/23 Published: 25/05/23

Christianity's Earliest Encounter with the Ancient Techno-Scientific China: Critical Lessons from *Jingjiao*'s Approach

Jacob Chengwei Feng

Abstract: This article investigates the earliest Christian encounter with ancient China through the missionaries of the Church of the East in the seventh century. In his monumental *Science and Civilisation in China*, Joseph Needham argues that China was then a country with one of the world's most advanced science and technology. It was also a time when Buddhism, Daoism, Confucianism, Manichaeism, and Zoroastrianism contributed to a pluralistic society. The paper attempts to answer questions such as: How did the Christian missionaries, as representatives of a minority religion, engage with techno-scientific China theologically? Were their efforts successful? What critical lessons can we learn from their successes and/or failures? By studying the earliest Christian texts in China, the proposal argues that, being equipped with advanced Greek-Byzantine scientific knowledge and skills in medicine, architecture, astronomy, and mechanics, the Church of the East missionaries boldly engaged with the ancient techno-scientific and pluralistic China through their *qi*-tological, or creative pneumatological approach, which is closely intertwined with the Chinese metaphysical concept of *qi* (or *Chi*, breath, air). The article proposes that such an approach serves as a crucial bridge toward a constructive Chinese theology of science for the pluralistic world of the third millennium.

Jacob Chengwei Feng is currently a PhD candidate (ABD) at Fuller Theological Seminary in Pasadena, CA, majoring in Theological Studies. His research interests include systematic theology, theological interpretation of Scripture, Chinese theology, religion and science, and ecumenical and interfaith dialogue with world religions.
The author is grateful to the *CPOSAT* reviewers and proofreaders for their input and suggestions.

Keywords: Church of the East; *Jingjiao*; *qi*-tological approach; techno-scientific China; theology and science

When the Church of the East sent its missionaries to China in the seventh century,[1] in a sense, they faced a much more challenging situation than their colleagues of the Western churches. (Here, "mission" and "missionaries" are not used in their modern sense. Rather, this paper adopts Steve Cochrane's definition in *Many Monks across the Sea*, where

1 Vince L. Bantu, *A Multitude of All Peoples: Engaging Ancient Christianity's Global Identity* (Downers Grove, IL: IVP Academic, 2020), 202. This group is usually dismissed as "Nestorian" and therefore deemed heretical. However, Brock has strongly argued that the so-called Nestorian church has, in antiquity, preferred to self-describe itself as the "Church of the East." The association between the Church of the East and Nestorius is "of a very tenuous nature," and is "totally misleading and incorrect." See Sebastian P. Brock, "The 'Nestorian' Church: A Lamentable Misnomer," *Bulletin of John Rylands Library* 78:3 (1996): 23–35, at 35, DOI: 10.7227/BJRL.78.3.335. Lin Ying speculates that besides the Church of the East, another branch of Christianity also from Syria also sent their missionaries, the Fulin monks—or the Melkites—to China during the Tang dynasty. See Ying Lin 林英, "Fulin Seng: Guanyu Tangdai *Jingjiao* zhiwai de Jidujiao paibie ruhua de yige tuice 拂菻僧: 关于唐代景教之外的基督教派别入华的一个推测" [The Fulin Monks: Speculation concerning another Christian sect into China during the Tang Dynasty apart from the *Jingjiao*] *Studies in World Religions* 世界宗教研究 2 (2006): 107–116. There are many works on this topic, in Chinese, English, French, and Japanese. For a recent bibliography, see James Harry Morris and Cheng Chen, "A Select Bibliography of Chinese and Japanese Language Publications on Syriac Christianity: 2000–2019," *Hugoye: Journal of Syriac Studies* 23:2 (2020): 355–415. Regarding the physical location of *Daqin* and *Fulin*, Samuel Lieu argues that contrary to most popular views, the name *Daqin* was first used to designate not the Roman Empire but the Greek successor-states that flourished after the death of Alexander the Great in the Near East, the most important being the kingdom founded by Seleucus I Nicator in 312 BC. Long before Rome became a major power in the Near East under Trajan (r. 98–117), *Daqin* had been in use as the Chinese name for a major state west of Parthia. Moreover, *Daqin* was never used for Romans or the Roman Empire in Central Asian language. Regarding *Fulin*, it is attested in Manichaean texts in Parthian as *hrwm* and it is most likely this form of the name which was phonetically transcribed commonly as *Fulin* in Chinese. For Lieu, *Fulin* can only designate the whole of the Roman Empire and not merely the Roman East nor what post-Renaissance scholars would call "Byzantium." See Samuel N. C. Lieu, "Daqin 大秦 and Fulin 拂林: The Chinese Names for Rome," in *Between Rome and China: History, Religions and Material Culture of the Silk Road*, ed. Samuel N. C. Lieu and Gunner Mikkelsen, Silk Road studies 18 (Turnhout: Brepols, 2016): 123–145, esp. 126–128.

mission entails elements of presence and encounter leading to an outward involvement in witness from the Church of the East to other communities.[2]) The Western missionaries expanded by supplanting theologically weak religions while spreading among illiterate peoples (e.g., in Germania and the British Isles) or by receiving help from civil authorities.[3] On the contrary, China was already a highly developed civilisation that can be traced to 1,200 BC.[4] According to McClellan and Dorn, "the medieval China was scientifically and technologically more developed than Europe in many fields."[5] In particular, the Tang dynasty is known for its warm welcome to strangers—such as the Arabs, Persians, and Syrians —to such an extent that its capital city of Chang'an became "an international meeting place."[6] As a result, "[n]ew foreign religions were imported: Zoroastrianism early in the sixth century, … and Manichaeism from Persia at the close of the seventh century."[7] Compared to those newly imported religions, the Chinese indigenous religion Daojiao 道教 (religious Daoism)[8] enjoyed the official status as

2 See Steve Cochrane, *Many Monks across the Sea: Church of the East Monastic Mission in Ninth-Century Asia*, Regnum studies in mission (Oxford: Regnum Books International, 2017), 11.

3 Christoph Baumer, *The Church of the East: An Illustrated History of Assyrian Christianity* (London: I. B. Tauris, 2016), 187.

4 According to William Boltz, if language as a determinative feature of cultural or civilisational identity takes on such preeminence, then we can only identify a "Chinese civilisation"—as opposed to "civilisation in China"—when we can identify the people of that civilisation as Chinese speakers. Thus, strictly speaking, we can only identify a *Chinese* civilisation from the time of the earliest palaeographic evidence of the Chinese language, i.e., about 1200 BC. See William G. Boltz, "Early Chinese Writing," World Archaeology 17:3 (1986): 420–436, esp. 420, DOI: 10.1080/00438243.1986.9979980. Also see James E. McClellan, III and Harold Dorn, *Science and Technology in World History: An Introduction*, revised and updated ed. (Baltimore: Johns Hopkins University Press, 2015), 115.

5 McClellan and Dorn, *Science and Technology*, 156.

6 Joseph Needham and Colin A. Ronan, *The Shorter Science and Civilisation in China: An Abridgement of Joseph Needham's Original Text*, 2 vols. (Cambridge University Press, 1978), 1: 46.

7 Needham and Ronan, *Shorter Science and Civilisation*, 1: 46.

8 In this paper, the Chinese words in the main texts are given in Pinyin system in italics, then, if necessary, the simplified Chinese character, followed by English translation in parenthesis, except words and phrases such as the name Watchman Nee, which are better known in the English-speaking world. The

the state religion during the Tang dynasty.[9] Buddhism and Confucianism also had deep roots among the bureaucrats and the grassroots.

This paper seeks to address questions such as: How did the East Syrian missionaries engage with techno-scientific China theologically, while representing a minority religion? Were their efforts successful? What critical lessons can we learn from their successes and/or failures? By studying the earliest written records of *Jingjiao* 景教 (or the Luminous Religion/Teachings), I argue that—being equipped with advanced Greek-Byzantine scientific knowledge and skills in medicine, horology, architecture, astronomy, and mechanics—the Church of the East missionaries boldly engaged with the ancient techno-scientific and pluralistic China by their *qi*-tological, or creative, pneumatological message.

Concretely, I will first analyse the historical background of the Syrian monks in order to identify how they encountered China scientifically and technologically. Then I will study *Jingjiao*'s primary texts to determine the theological strategy by which they established their unique religious identity and promoted Christian teachings. Finally, I will extrapolate the outcomes of *Jingjiao*'s experience, especially its pneumatological dimension, for the encounter of Christian theology with the contemporary techno-scientific world.

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names of people and places in Chinese Pinyin will be given in regular font.

9 According to Timothy Barrett, Daoism enjoyed the status of state religion during the Tang dynasty due to a few reasons: first, it had been a Chinese indigenous religion; second, Daoist religion transcended the concepts of heaven, earth, and humanity of the Confucian classics, and assigned the emperors with a special status of *Tian Zi* (son of the heaven), thus regarded as intermediaries between heaven and humanity; third, by claiming Lao Zi, whose last name is Li, as the ancestor of the family, the emperors of the Tang dynasty with the same last name could claim legitimacy of their reigning. See Timothy Hugh Barrett, *Taoism under the T'ang: Religion and Empire during the Golden Age of Chinese History* (Warren, CT: Floating World, 2006), 20.

The Syrian Monks' Scientific and Technological Strategy

The Church of the East declared itself independent from the state church of the Roman Empire at the synod of 424.[10] In 489, their centre at Edessa was shut down, and the Assyrian Christians of the Church of the East fled the Byzantine rule while bringing Greek learning with them. As a result, Persian cultural life was enriched with new elements. A significant translation project took place in Jundishapur, to render Greek texts into Syriac (a dialect of Aramaic). Texts deemed to contain useful knowledge were generally chosen for translation—mainly the medical arts, but also scientific subjects including Aristotle's logical tracts, mathematics, and astronomy.[11] Given their scientific expertise in general and medical knowledge in particular, certain Syriac-speaking Christians even became influential figures at the Persian court. They transmitted Greek, Syriac, Persian, and occasionally Indian medical traditions, and other forms of cultural and scientific knowledge to the Middle East, Central Asia, and beyond.[12] They were known for their medical expertise in the East.[13]

When Aluoben 阿罗本, most probably a monk or bishop named Yaballaha or Abraham,[14] and the Assyrian missionaries of the Church of the East arrived at Chang'an in 635, they brought with them Greek medicine, medical skills, and practical treatments, which provided them

10 Christoph Baumer, *The Church of the East: An Illustrated History of Assyrian Christianity* (London: I. B. Tauris, 2006), 81.

11 McClellan and Dorn, *Science and Technology*, 120.

12 Matteo Nicolini-Zani, *The Luminous Way to the East: Texts and History of the First Encounter of Christianity with China* (Oxford University Press, 2022), 102.

13 Henry Yule and Henri Cordier H.裕尔 and H.考迪埃, *Dongyu jicheng lucong* 东域纪程录丛 [Cathay and the Way Thither, Being a Collection of Medieval Notices of China], trans. Xushan Zhang (Kunming: Yunnan renmin chubanshe 云南人民出版社, 2002), 84; Friedrich Hirth 夏德, *Daqin guo quanlu* 大秦国全录 [China and the Roman Orient], trans. Jieqin Zhu, Daxiang xueshu yicong (Zhengzhou: Daxiang chubanshe 大象出版社, 2009), 303.

14 H. Takahashi, "Transcribed Proper Names in Chinese Syriac Christian documents," in *Maiphono w-Rabo d-Malphone*, ed. G. A. Kiraz, Studies in Honor of S. P. Brock (Piscataway, NJ: Gorgias, 2008): 631–662, esp. 639.

with opportunities for preaching.[15] The famous 781 Xi'an Stele speaks of the monk Yisi 伊斯, the Persian Yazdbōzīd, priest and chorepiscopus, as the "Great Donor, Great Master of the Bright Prosperity [decorated] with Golden [Seal] and Purple [Ribbon]," whose "knowledge extended to all fields."[16] Such honorific words of praise might seem like an exaggeration, considering his generous donation to erect the Stele. However, Yisi's biography indicates his excellent military combat and medical skills. Yisi became the "claw and tooth" of Duke Guo Ziyi 郭子仪 (697–781) and the "ear and eyes" of the army.[17] In other words, Yisi served as the Duke's think-tank and intelligence spy.[18] Moreover, each year Yisi "gathered the monks of the four monasteries, served them with respect, and presented refined offerings for fifty days. [On that occasion] ... the sick were cured and healed."[19] According to Nie Zhijun 聂志军, the description of Yisi on the Stele, namely, *yibo shiquan* 艺博十全, literally means "ten sicknesses, ten healings" (*zhibing shizhi shiyu*, 治病十治十愈), referring to his superb medical skills.[20]

Another *Jingjiao* believer known for his medical expertise is Chongyi 崇一,[21] who healed the older brother of Tang emperor

15 E. A. Wallis Budge, The Monks of Kûblâi Khân, Emperor of China: Or, The History of the Life and Travels of Rabban Ṣâwmâ, Envoy and Plenipotentiary of the Mongol Khâns to the Kings of Europe, and Markôs Who as Mâr Yahbh-Allâhâ III Became Patriarch of the Nestorian Church in Asia (London: Religious Tract Society, 1928), 37; quoted in Qianzhi Zhu 朱谦之, Zhongguo *Jingjiao*: Zhongguo gudai Jidujiao yanjiu 中国景教: 中国古代基督教研究 [Chinese *Jingjiao*: Research of Ancient Christianity in China] (Beijing: Dongfang chubanshe 東方出版社, 1993), 69.

16 Nicolini-Zani, *Luminous Way*, 213.

17 Nicolini-Zani, *Luminous Way*, 213.

18 Zhijun Nie 聂志军, "Jingjiaobei zhong 'Yisi' yeshi Jingyi kao 景教碑中'伊斯'也是景医考" [An Investigation of Yisi as a Medical Doctor in the *Jingjiao* Stele] *Dunhuangxue jikan* 敦煌学辑刊 3 (2008): 119–127, at 120.

19 Nicolini-Zani, *Luminous Way*, 213.

20 Nie, "Jingjiao bei," 124.

21 For the record of Chongyi in the ancient Chinese sources, see Xu Lu 劉昫, *Jiu Tangshu* 舊唐書 [Book of Old Tang Dynasty], 214 vols (Beijing: Zhonghua shuju 中华书局, 1975), 95: 3012; Ouyang Xiu and Qi Song (eds), *Xin Tangshu* 新唐書, 248 vols (Beijing: Zhonghua shuju, 1975), 81: 3598. Scholars are of different opinions regarding Chongyi's membership in *Jingjiao*. Chinese scholars such as Chen Yuan 陈垣, Wang Zhixin 王治心, Lin Wushu 林悟殊, and Zhang Xushan 张绪山 hold the majority opinion that Chongyi was a *Jingjiao* believer, considering

Xuanzong 玄宗 in 740.[22] Qin Minghe 秦鸣鹤 cured Emperor Gaozong 高宗's eye problems through the use of a technique that involved bloodletting,[23] or trepanning, which can be traced to the famous Greek doctor Hippocrates (c. 460–c. 375 BC).[24]

Yin Xiaoping 殷小平 observes that historical studies on *Jingjiao* have primarily focused on the Greek medical traditions possessed by the East Syriac Christians in China, but have not concentrated on their

all available factors in a comprehensive manner. See Yuan Chen 陈垣, *Chen Yuan xueshu lunwenji* (Di Er Ji) 陈垣学术论文集（第二集）[A Collection of Chen Yuan's Scholarly Work (2)] (Beijing: Zhonghua shuju 中华书局, 1982), 1: 85, 97; Zhixin Wang 王治心, *Zhongguo Jidujiao Shigang* 中国基督教史纲 [A Historical Sketch of Chinese Christianity] (Shanghai: Shanghai wenhai chubanshe 上海文海出版社, 1940), 41; Wushu Lin 林悟殊, "Jingjiao zai Tangdai Zhongguo chuanbo chengbai zhi wojian 景教在唐代中国传播成败之我见" [My Opinion on *Jingjiao*'s Success and Failure in Its Spread in China in the Tang Dynasty] *Huaxue* 华学 3 (1998): 83–95, esp. 88. Others such as Cao Shibang and Matteo Nicolini-Zani think otherwise. See Shibang Cao 曹仕邦, "Tangdai de Chongyi fashi shi 'Jingjiao seng' ma? Zeng Chen Shou'an xiansheng de lunshuo 唐代的崇一法师是'景教僧'吗？谘陈授菴先生的论说" [Was Chongyi, Master of the Law in the Tang Dynasty, a Monk of the Luminous Teaching? A Discussion with Mr. Chen Shou'an], *Xiang gang fo jiao* 香港佛教 [Buddhism in Hong Kong] 292 (1984): 16–20; Nicolini-Zani, *Luminous Way*, 99.

22 The ancient Chinese records (see note 21) show that the Tang emperor Xuanzong was sick and then healed by Chongyi in 740. See Xushan Zhang 张绪山, "Jingjiao dongjian ji chuanru Zhongguo de Xila-Baizhanting wenhua 景教东渐及传入中国的希腊—拜占庭文化" [Jingjiao's Spreading Eastward and the Greek-Byzantine Culture's Entrance into China], *Shijie lishi* 世界历史 6 (2005): 76–88, esp. 81.

23 For ancient Chinese sources, see Lu, Jiu Tangshu [Book of Old Tang], *Gaozong benji* 高宗本纪, 5: 975. Also see Nicolini-Zani, *Luminous Way*, 100.

24 Zhang, "Jingjiao," 82–83. Consensus has not yet been reached as to Qin's origins and religious affiliation. For example, Nicolini-Zani reminds his readers that "[o]ne should also consider that from its earliest days in China, Buddhism was dedicated to finding cures for various illnesses, and Buddhist monks, together with Daoist priests, practiced medicine at the Chinese court to a far higher degree than Christians." See Nicolini-Zani, *Luminous Way*, 100. However, Zhang's argumentation based on the comparison of the Chinese historical records seems to be more convincing. Zhang Xushan argues that, compared with the record based on *Datang xinyu* and *Xin Tangshu*, which include both Zhang Wenzhong and Qin Minghe as physicians involved in the cure, *Jiu Tangshu* and *Zizhi tongjian* only document *Qin* as the physician. This implies that Qin played a dominant role in the healing of Gaozong's eye disease. Qin's name disappears in the later historical records, which is most likely because of the Huichang Persecution of Buddhism (841–845) and the official attitude towards *Jingjiao* afterwards. Moreover, the last name Qin indicates his ancestry could be traced to Daqin, namely, the Byzantine Empire in the Tang dynasty. See Zhang, "Jingjiao," 83.

accomplishments in astronomy. The first example recorded in the 781 Xi'an Stele is Jihe 佶和, who is described as one "who, upon observing the stars turned in the direction of the Transformation, and keeping before his eyes the sun, went to pay homage to the Honoured One."[25] Zhang Xushan 张绪山 speculates that, most likely, Jihe was good at observing stars and other astronomical phenomena.[26] Furthermore, Li Su 李素 (or Li Wenzhen, or Luke) was recruited as an officer in *Sitian Tai* 司天台 (the Bureau of Astronomy) , which proves the advanced science and technology possessed by the *Jingjiao* believers.[27] Li's office was responsible for the compilation of the calendar. Later, he was appointed governor of Jinzhou in Hezhong Superior Prefecture (today's Shanxi).[28] Bill Mak makes the following observation regarding the political significance of his appointment to the Bureau of Astronomy:

> The role foreigner astronomers played in the Tang court is noteworthy as it demonstrates the interest in foreign ideas within the multiethnic Tang society on one hand, as well as the special role the astral science played in Chinese politics on the other. [Li Su], like other skilled foreigners and Chinese with special talents, was recruited directly by the emperor and given special titles, bypassing the official imperial examination system. Due to the technical as well as the confidential nature of those working in the Bureau of Astronomy, who handled sensitive matters pertaining to state security, such arrangements, in particular with the foreigners who had fewer ties with the Chinese, would have been a political sound choice.[29]

25 Nicolini-Zani, *Luminous Way*, 209.
26 Zhang, "Jingjiao," 87.
27 Another example is Aixue (爱薛, Ngai-Sie, 1227–1308) in the Yuan Dynasty, who was responsible for the calendar system of the Western Religion (xiyu 西域). See Lian Song, *Yuanshi* 元史, Dianjiao ed., 210 vols. (Beijing: Zhonghua shuju 中华书局, 1976), 134: 3248–3249, quoted in Xiaoping Yin 殷小平, "Tang Yuan *Jingjiao* guanxi kaoshu 唐元景教关系考述" [A Study on the Nestorian in the Tang and Yuan Dynasties], *Xiyu yanjiu* 西域研究 [*The Western Regions Studies*] 2 (2013): 51–59, at 53.
28 Nicolini-Zani, *Luminous Way*, 103.
29 Bill M. Mak, "Astral Science of the East Syriac Christians in China during the Late First Millennium," *Mediterranean Archaeology & Archaeometry* 16:4 (2016): 87–92, esp. 89, DOI: 10.5281/zenodo.220904; quoted in Nicolini-Zani, *Luminous Way*, 103.

Other Greek-Byzantine technologies transmitted to China by the *Jingjiao* missionaries include bell-making techniques and architectural skills.[30] As a result, Zhu Qianzhi 朱谦之 argues that

> The "exotic, foreign, and delicate instruments" designed by the Jingjiao monk Jilie and Marine Trade Supervisor Zhou Qingli must have arrived at the high peak of mechanical science at the time. Like Matteo Ricci (1552–1610), who offered the emperor a chiming clock, sundial, and map, the *Jingjiao* followers' exotic and precious gifts must have been soul-stirring to the Tang emperor. No wonder Jilie secured the imperial favour. As a result, *Jingjiao*'s reputation was restored.[31]

Jingjiao's Strategy in the Techno-Scientifically Advanced China

I have shown how the Syriac-speaking Christians creatively engaged techno-scientific China. Although they faced enormous challenges from the highly civilised Tang society, they grasped unique opportunities by carrying out the following strategic moves: first, in addition to their political loyalty to the Tang court,[32] they boldly demonstrated their medical, astral, and architectural knowledge and skills before royalty in order to secure legal standing in the religiously pluralistic country. Second, they also shared their medical expertise to the population in the form of Christian charity and hospitality by curing and healing the sick, feeding the hungry, clothing the naked, and burying the dead. This charitable ministry of the *Jingjiao* followers facilitated the expansion of their influence, impressing the Chinese people.[33] Third, their loyalty

30 Zhang, "Jingjiao," 85–87.

31 Zhu, *Zhongguo Jingjiao*, 71–72 (translation mine).

32 R. Todd Godwin argues that *Jingjiao*'s connection with the Tang court and the Church of the East's connection with the Persian (Abbasid) court run much deeper than had been previously supported. See R. Todd Godwin, *Persian Christians at the Chinese Court: The Xi'an Stele and the Early Medieval Church of the East* (London: I. B. Tauris, 2018).

33 Xiaohong Xu 徐晓鸿, "Tangdai *Jingjiao* renwu kaolue 唐代景教人物考略" [A Concise Examination of the Persons of *Jingjiao* in Tang Dynasty], *Jinling shenxue zhi* 金陵神学志 [Nanjing Theological Review] 67:2 (2006): 25–53, at 45.

to the Tang dynasty and charity to its people stood the test of severe political rebellion and military onslaught. The An Lushan 安禄山 Rebellion (755–763) marked the turning point of the Tang dynasty from flourishing to decaying, during which Yisi served under the Chinese general and high official Guo Ziyi. Later, the Tang court granted him the title of "vice military commissioner of Shuofang, probationary director of the Palace Administration."[34]

The *Jingjiao*'s expertise in science and technology can be traced at least to their missionary activities in Central Asia.[35] Here is what Nicolini-Zani remarks about the Christian community of Merv: "In ancient times Merv constituted a great center of study, which certainly attracted the Christians of the eastern regions of Iran and allowed them to be educated and formed in both theological and secular sciences."[36] At the gates of Asia, Merv, "due to its central geographical position, attracted the envoys of the world religions in a special manner,"[37] including Buddhism, Manichaeanism, and Christianity.[38] Therefore, before their missionary trips to China, the *Jingjiao* monks had also been trained to "deal with the adherents of a multiplicity of religious, intellectual, and cultural expressions," and "to learn to dialogue with them, thereby progressively finding ways to define its [i.e., *Jingjiao*'s] particular identity within this pluralist milieu."[39]

One thing worth noting is that missionaries of Manichaeanism and Zoroastrianism traveled eastward to China even earlier. Though equally exposed to opportunities for scientific learning in Central

34 Nicolini-Zani, *Luminous Way*, 88.

35 The Church of the East's engagement with science and technology can be further traced to their homeland in Mesopotamia, including the school of Edessa and the school of Nisibis. See Wilhelm Baum and Dietmar W. Winkler, *The Church of the East: A Concise History* (London: Routledge-Curzon, 2003), 11, 21; Anonymous, "The School of Edessa," N/A, http://nestorian.org/the_school_of_edessa.html (accessed 8 May 2023); Arthur Vööbus, *History of the School of Nisibis* (Leuven: Peeters, 1985).

36 Nicolini-Zani, *Luminous Way*, 48.

37 Ian Gilman and Hans-Joachim Klimkeit, *Christians in Asia before 1500* (Richmond: Curzon, 1999), 206.

38 Nicolini-Zani, *Luminous Way*, 47–48.

39 Nicolini-Zani, *Luminous Way*, 48.

Asia, the Manichaeans and the Zoroastrians in China did not appear to resort to science and technology as much as the Syriac-speaking Christians.[40] These three religions constitute *sanyijiao* 三夷教 (the three Persian religions). Their missional strategies were so different from each other that Cai Hongsheng 蔡鸿生 characterises them as follows: "the Manichaeans turned increasingly heretical, the Zoroastrians increasingly folkloric, and the *Jingjiao* increasingly dependent on technological skills."[41] Though Cai's statement runs the risk of being overly reductionist, this sharp contrast points to *Jingjiao* missionaries' scientific learning and cultivation of technological skills in order to establish a firm footing in the highly civilised Tang dynasty.

Having summarised their creative strategy in techno-scientifically advanced China, I now proceed to examine the source of their creativity.

The East Syriac Monks' *Qi*-tological Theology of Creation

It is well known that in translating their religious texts, the *Jingjiao* monks adopted terminology from Daoist, Buddhist, and Confucian texts in Chinese.[42] Voluminous scholarly works on the *Jingjiao* texts have focused on identifying the source of specific terms, their interpretation,

40 Chengyong Ge, "Jingjiao zai Tangdai de xingshuai yu liuchan wenming mingyun 景教在唐代的兴衰与流产文明命运" [The Rising and Decaying of *Jingjiao* during the Tang Dynasty and the Destiny of Miscarried Civilisation], Pushi shehui kexue yanjiu wang 普世社会科学研究网 [Pu Shi Institute for Social Science], updated 7 July 7 2022, http://www.pacilution.com/ShowArticle.asp?ArticleID=12501 (accessed 22 November 2022).

41 Hongsheng Cai 蔡鸿生, "Xuyan 序言," [Preface] in *Tangdai Jingjiao zaiyanjiu* 唐代景教再研究 [Reexamination of *Jingjiao* in the Tang Dynasty], ed. Wushu Lin (Beijing: Zhongguo shehui kexue chubanshe 中国社会科学出版社, 2003): 1–4, esp. 4. Cai's hypothesis is further expounded by Lin Wushu. See Wushu Lin 林悟殊, "Tangdai sanyijiao de shehui zouxiang 唐代三夷教的社会走向" [Social Orientation of the Three Persian Religions in the Tang Dynasty], in *Tangdai Zongjiao Xinyang yu Shehui* 唐代宗教信仰与社会, ed. Xinjiang Rong (Shanghai: Shanghai cishu chubanshe 上海辞书出版社, 2003): 359–384.

42 See, for example, Chen, Huaiyu **陈怀宇**, "*Tangdai Jingjiao yu Fo Dao guanxi xinlun* 唐代景教与佛道关系新论" [New Discussions on the Relationship between *Jingjiao* and Buddhism-Taoism in the Tang Dynasty], *Shijie zongjiao* Yanjiu 世界宗教研究 [Studies in World Religions] 5 (2015): 51–61.

and translations. However, there has been a lack of in-depth theological analysis of *Jingjiao*'s doctrine of creation beyond tracing the sources of terminology and general description of their theological features.[43] A careful study of their doctrine of creation reveals its pneumatological nature and brings to the fore their theological creativity. Their theology of creation is exemplified in the first two lines of the Stele, which can be translated as follows:

> Behold! [there is One who is] constant in truth and tranquility, prior to every beginning and without origin, profound in [creating] the universe, later than the latest, mysterious in calling nothing into being,[44] who, grasping the key of mysteries, creates and transforms [everything], and enlightens many honoured beings as the Creator[45]—is this not properly God, the transcendent person of our Three-One, True Lord without origin? Drawing a cross, he pacified the four areas of space; arousing the Spirit of God, he produced the two breaths. Darkness and emptiness were transformed, heaven and earth were separated; the sun and the moon began to rotate, the day and the night began to alternate.

43 Tang Li mentioned creation only in passing in her discussion of *Jingjiao*'s doctrine of the Trinity, Christology, and contextualised theology; incidentally, she seems to have missed that their thoughts on the Trinity and Christology were also contextualised. See Li Tang, *A Study of the History of Nestorian Christianity in China and Its Literature in Chinese: Together with a New English Translation of the Dunhuang Nestorian Documents*, second rev. edn, European University Studies Series 27: Asian and African Studies 87 (Frankfurt am Main: Peter Lang, 2004), 134–144. Johan Ferreira does not fully expound *Jingjiao*'s theology of creation in his chapter on "The Theology of Tang Christianity." Moreover, he relies too much on Saeki's translation, which, for the most part, is outdated. See Johan Ferreira, *Early Chinese Christianity: The Tang Christian Monument and Other Documents*, Early Christian studies 17 (Brisbane: St Pauls, 2014), 316–354, esp. 336.

44 According to Wu Changxing, *lingxü* (灵虚) means *taixü*, *yuzhou* (太虚, 宇宙), namely, the universe; *houhou* means "existing after thousands of generations, until an unending future"; *miaoyou* means "the mystery of [creation] from nothing into being." See Changxing Wu 吴昶兴, *Daqin Jingjiao liuxing Zhongguo bei*: *Daqin Jingjiao wenxian shiyi* 大秦景教流行中国碑：大秦景教文献释义 [The Stele of the Diffusion of the Luminous Teaching in China: Expounding on the *Jingjiao* Literature], (Xinbei: Ganlan chuban youxian gongsi 橄榄出版有限公司 [Olive Publishing], 2015), 9.

45 Wu Changxing regards *yuanzun* 元尊 as "the head of the Most High, referring to the Creator." See Wu, *Daqin Jingjiao*, 9.

> After having formed and completed all things, he created the first human being. Additionally, he endowed him with every good quality in a harmonious whole and gave him dominion over the myriad creatures.[46]

A few theological observations are in order: first, *Jingjiao*'s theology of creation is distinctively Christian and trinitarian in its use of languages such as "Three-One," "cross," and the "Spirit of God," even though, as Nicolini-Zani shows, "[t]he Chinese word used here, *zaohua* 造化, is a technical term that refers to a fundamental tenet of Daoist cosmology."[47] Second, *erqi* 二气 ("the two breaths") refers to *yin* 阴 and *yang* 阳,[48] which are the constituting elements in Chinese cosmology. Here, the author of the Stele integrates the Holy Spirit with the Chinese metaphysical concept of *qi* 气 (or *Chi*, breath, pneuma, spirit).[49] A further investigation of the word *qi* indicates that the word appears ten times in the entire Tang *Jingjiao* corpus.[50] Commenting on the Xi'an Stele, Max Deeg states:

> [A] primordial situation of the cosmos before God begins to act, a situation which is very [much in] conform[ity] with the traditional Chinese cosmological or cosmogonic scheme of chaos which has

46 Translation adapted from Nicolini-Zani. See Nicolini-Zani, *Luminous Way*, 197–198.

47 Nicolini-Zani, *Luminous Way*, 198, n. 6.

48 Nicolini-Zani, *Luminous Way*, 198, n. 13.

49 For Chinese Philosopher Zhang Dainian 张岱年 (1909–2004), *qi* is a basic concept in ancient Chinese philosophy that expresses what is said to be "material existence" in contemporary Chinese. Originally, *qi* refers to flowing and minute forms of existence, different from those that are liquid and solid. In the process of development of ancient thought, *qi* also refers to phenomena of objective reality that exist in independence of human consciousness. Since humans and other living things survive by breathing, the ancient people believed that *qi* is the source of life, even though *qi* on its own is not life. Therefore, *qi* is a concept used generally to refer to objective reality. See Dainian Zhang 张岱年, *Zhongguo gudian zhexue gainian fanchou yaolun* 中国古典哲学概念范畴要论 [Key Conceptual and Categorical Points in Chinese Ancient Philosophy], (Beijing: Zhonghua shuju 中华书局, 2017), 35–38.

50 Once in the Xi'an Stele; four times in *Yishen Lun* (The Discourse on the One God); three times in *Xuting mishisuo jing* (Book of Righteous Mediator); twice in *Zhixuan anle jing* (Book on Profound and Mysterious Blessedness).

> not yet developed into duality and not brought forth the concrete phenomena. The creative function of God then is first restricted to the extension of space in which the original energy, the *qi*, is able to develop the two polar principles which are made concrete by the separation of heaven and earth.[51]

Also pertinent to the discussion of *qi* in *Jingjiao*'s theology of creation are occurrences of the word in *Xuting mishisuo jing* 序听迷诗所经 (Book of Righteous Meditator) and *Zhixuan anle jing* 志玄安乐经 (Book on Profound and Mysterious Blessedness). The former finds its origin in Genesis 2:7 in that "everyone holds within herself the *qi* (breath) of the Honoured One of Heaven." Here the physical and spiritual senses of *qi* are actively engaged in *Jingjiao*'s theology of creation.[52] In *Zhixuan anle jing*, the word *qi* appears together with *fanhun baoxiang* 返魂宝香 (a precious scent): "One breathes the wonderful breath of the precious scent that awakens the soul, then the dead will return to life and disease will be eradicated."[53] The *Jingjiao* Christians are believed to be the "first medical missionaries … from the Middle East who arrived in China" who introduced Western medical practice into China. Their medical fame preceded them if we remember that their immediate ancestors translated many Greek medical works into Arabic,[54] and they were famous in Western Asia for their medical skills.[55]

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51 Max Deeg, "The 'Brilliant Teaching': The Rise and Fall of 'Nestorianism' (Jingjiao) in Tang China," *Japanese religions* 31:2 (2006): 91–110, at 99.

52 For Nicolini-Zani, physical and spiritual balance is given by the proper flow of *qi*. Here it seems to indicate a sort of vital breath (that of Genesis 2:7?) with which God shares life with the first human being. See Nicolini-Zani, *Luminous Way*, 266.

53 若闻反魂宝香妙气, 则死者反活, 疾苦消纾. The allusion of this type of perfume is also present in the Stele, where it describes Daqin (corresponding to the eastern provinces of the Roman Empire), the land of origin of *Jingjiao*. See Nicolini-Zani, *Luminous Way*, 295. According to Zhou Jiazhou, the earliest Chinese record *fanhun xiang* 返魂香 (Scent for Resuscitating the Soul) was a tribute from the Western Regions. See Jiazhou Zhou 周嘉胄, *Xiangcheng* 香乘 [Encyclopedia on Scents] (Beijing: Jiuzhou chubanshe 九州出版社, 2014), 158.

54 Friedrich Hirth, *China and the Roman Orient: Researches into Their Ancient and Mediaeval Relations as Represented in Old Chinese Records* (Leipzig: Georg Hirth, 1885), 40, 55, 59.

55 K. Chimin Wong and Lien-teh Wu, *History of Chinese Medicine: Being a Chronicle*

Jingjiao's connection between medicine and *qi* is more interesting if we consider the usage of *qi* in the Tang era and even earlier. According to Elisabeth Hsu, *qi* tended to be related to the internal regulation of breaths and emotions in the late Warring States (476–221 BC) and early Han (202 BC–8 CE, 25–220 CE). Moreover, in pre-imperial China there was a close connection between *feng* 風/风 (wind) and *gui* 鬼 (ghosts), and between *qi* and *shen* 神 (spirits). In other words, *feng* and *qi* both connote the spirit world.[56] This corresponds to the expressions in *Xuting mishisuo jing*, in which *feng* is used to describe the transcendence of God and also the spirit that inhabits humans, who is also transcendent because it is of divine nature:

> The personal destiny of all living beings is determined by the spirit. At the moment life ceases to exist and their destiny approaches, the spirit abandons living beings. There is no spirit for the mind and thought, but they too are kept alive by the spirit. The moment the spirit abandons living beings is the moment of passage. But why do people not see the spirit depart? And what colour is the spirit? Red, green, or some other colour? It is not possible to see what the spirit is like.[57]

Third, the *Jingjiao* text often treats the Spirit and wind synonymously. First, the theology of creation reflects the creation account in Genesis 1 in a way that can be likened to the missionaries sent to China in the late nineteenth century who were "disguised in Chinese dress."[58] Namely,

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of Medical Happenings in China from Ancient Times to the Present Period (Tientsin: The Tientsin Press, 1933), 259–261.

56 Elisabeth Hsu, "The Experience of Wind in Early and Medieval Chinese Medicine," *The Journal of the Royal Anthropological Institute* 13:1 (2007), DOI: 10.1111/j.1467-9655.2007.00400.x: S117–34, S119–20.

57 The allusion of this type of perfume is also present in the Stele, where it describes Daqin (corresponding to the eastern provinces of the Roman Empire), the land of origin of *Jingjiao*. See Nicolini-Zani, *Luminous Way*, 295. According to Zhou Jiazhou, the earliest Chinese record *fanhun xiang* 返魂香 (Scent for Resuscitating the Soul) was a tribute from the Western Regions. See Jiazhou Zhou 周嘉胄, *Xiangcheng* 香乘 [Encyclopedia] (Beijing: Jiuzhou chubanshe 九州出版社, 2014), 158.

58 Richard R. Cook, *Darkest Before the Dawn: A Brief History of the Rise of*

the *Jingjiao* authors used phrases from the state religion (Daoism) but endowed them with Christian meanings. For example, the Holy Spirit is referred to as *yuanfeng* (元风, literally "the primordial wind") that correlates with the "spirit of God," "wind of God," that hovers over the waters in the primordial void (Genesis 1:2).[59] Then, in line 5, *jingfeng* 净风 (pure wind), as the Pure Spirit of the Three-One, is the instrument of Messiah to establish the ineffable new teaching to shape virtuous practice through the right faith.[60]

Then, in line 6, *shuifeng* 水风 (water and wind) appears in the Syriac baptismal ritual, in which water and the Spirit are closely working together and serve as the means of immersion required by the Messiah's doctrine, resulting in humanity's being cleansed from vanity and undergoing purification to recover their purity and whiteness.[61] In the seventy-fourth of his *Hymns on Faith*, Ephrem speaks of the visible (water) and the invisible elements (the Spirit) in the baptismal ritual: "the Holy Spirit / who is mixed in the baptismal water / so that it may be for absolution."[62] The close association of *feng* 风 (wind) and the Spirit

Christianity in China (Eugene, OR: Pickwick, 2021), 109.

59 Nicolini-Zani, *Luminous Way*, 198, n. 12. Other scholars interpret *yuanfeng* differently. For example, Manuel Diaz interprets it as "the primordial elements before all things were separated, namely, chaos according to the Chinese history." See Manuel Diaz 阳玛诺, *Tang Jingjiao bei song zhengquan* 唐景教碑颂正诠 [Interpretation of the *Jingjiao* Stele in the Tang Dynasty] (Shanghai: Tushanwan yinshuguan 土山湾印书馆, 1927), 26, translation mine. Yang Rongzhi translates it as 太极 *taichi*. See Rongzhi Yang 楊榮鋕, *Jingjiao beiwen jishi kaozheng* 景教碑文紀事考正 [Textual Criticism of the Recording in the *Jingjiao* Stele], 3 vols, vol. 2 (Changsha: Hunan sixian shuju 湖南思贤书局, 1895, repr. 1901), 19. Lin Wushu examines the 7 references to *feng* 风 (lines 1–2, 6, 8–9, 11, 12, 20, 27) and concludes that "none refers to the Spirit of God." See Wushu Lin 林悟殊, "Jingjiao 'Jingfeng' kao: Yijiao wendian 'Feng' zi yanjiu zhi yi 景教'净风'考—夷教文典'风'字研究之一" [An Examination of Jingfeng in *Jingjiao*: The First Study on the Word 'Feng' in Western Religions], *Xiyu yanjiu* 西域研究 [The Western Regions Studies] 3 (2014): 50–64, esp. 54. However, such a view disregards the text's close association with the creation account in Genesis 1, which is clearly referred to in this section.

60 Nicolini-Zani, *Luminous Way*, 200.

61 Nicolini-Zani, *Luminous Way*, 202.

62 Ephrem the Syrian, *Hymns on Faith* 40.10, trans. Jeffrey Thomas Wickes, *The Fathers of the Church* (Washington, DC: Catholic University of America Press, 1947). See on this Sebastian P. Brock, *The Holy Spirit in the Syrian Baptismal Tradition*, Gorgias Eastern Christian studies 12 (Piscataway, NJ: Gorgias, 2008), 13.

is also attested in other *Jingjiao* documents: *liangfeng* 凉风 (cold breeze) and *fengliu* 风流 (wind current) in the *Xuting mishisuo jing*; *jingfeng* 净风 (pure wind) in the *Yishen lun* 一神论 (Discourse on the One God); *jingfengwang* 净风王 (the King of the Pure Wind) in the *Daqin Jingjiao sanwei mengdu zan* 大秦景教三威蒙度赞 (Hymn in Praise of the Salvation Achieved through the Three Majesties of the Luminous Teaching).[63]

Fourth, *feng* 风 (wind) is so closely tied to *Jingjiao*'s theology to the extent that the author of the Stele combines the word with *jing* 景 (line 11), namely, *jingfeng dongshan* 景风东扇 (the Luminous Breeze blew eastward). Nicolini-Zani argues that "[t]he character *jing* 景, 'light' or 'luminous,' that appears here and in other subsequent phrases is undoubtedly a reference to *jingjiao* 景教, 'Luminous Teaching.'"[64] Semiotically, Tamaki Ogawa traces the usage of the phrase *fengjing* 风景 to the Southern Dynasty (420–502) and argues that the phrase means "light and atmosphere," and that *jing* refers to the space and setting in which the light shines.[65] The Poet Yin Zhongwen 殷仲文 (d. 407) of the Sixth Dynasty closely associated *jing* with *qi* 气 (in *jingqi* 景气) as a synonym with *feng* (wind).[66] The Poet Wang Bo 王勃 (648–675) in the Tang Dynasty used *jing* in place of *feng*.[67] Therefore, it is reasonable to conclude that, by the Tang dynasty, the word *jing* refers to light

63 Liu Zhenning summarizes 8 different translations of the Holy Spirit in *Jingjiao* documents. Besides those terms related to *feng* 风, other translations include *luoji* 啰嘶 in the Book on Profound and Mysterious Blessedness; *zhengshen* 证身 in *Daqin Jingjiao sanwei mengdu zan* (the Hymn in Praise of the Salvation Achieved through the Three Majesties of the Luminous Teaching); and *luhe ningjusha* 卢诃宁俱沙 in *Zunjing* (the Book of the Honoured). See Zhenning Liu 刘振宁, *Shiyu 'guaikui' zhongyu 'guaikui': Tangdai Jingjiao 'geyi' guiji tanxi* 始于'乖睽'终于'乖睽': 唐代景教'格义'轨迹探析 [Originating from Deviation, Ending in Deviation: Exploring the Traces of 'Interpretation' of *Jingjiao* in the Tang Dynasty] (Guiyang: Guizhou daxue chubanshe 贵州大学出版社), 100, 134.

64 Nicolini-Zani, *Luminous Way*, 205, n. 61.

65 In his article "The Linguistic Changes of *fengjing* in Chinese Literature," Ogawa proposes that the earliest appearance of the phrase is in *Shishuoxinyu:Yanyu* (《世说新语•言语》). See Tamaki Ogawa 小川環樹, *Lun Zhongguo shi* 論中國詩 [On Chinese Poems], trans. Ruqian Tan, Zhicheng Chen, and Guohao Liang (Hong Kong: Zhongwen daxue chubanshe 中文大学出版社, 1986), 15.

66 Ogawa, *Lun*, 8.

67 Ogawa, *Lun*, 11.

and wind, great or universal, and "to venerate, admire,"[68] and that the Syriac-speaking missionaries creatively took advantage of the multi-faceted meaning of the word *jing* and used it to name their religion. It can be further argued that such a strategic choice of the Chinese character to name their religion not only shows that *Jingjiao* brings the true light to people, but also demonstrates its strong pneumatological emphasis. For example, the various invocations to the Spirit have been found in the Syriac Acts of Thomas, which constitute the earliest extensive non-biblical Syriac text that survives, going back to about the third century.[69] Specifically, in the Acts of Thomas, one probably finds the first attestation in Syriac of the identification of the *ruḥā* (Genesis 1:2) with the Holy Spirit.[70] Moreover, celebrated as the "Harp of the Spirit" in Syriac traditions, the poet-deacon Ephrem (d. 373) played a foundational role in Syriac theology and biblical interpretation.[71] Another authority in the School of Edessa that has deeply influenced the theology of the Assyrian Church of East, namely, Theodore of Mopsuestia (c. 350–428), was chosen to represent the Orthodox position at a discussion with the Macedonians over the full divinity of the Holy

68 Zhu Donghua suggests that the word *jing* 景 should be holistically understood both from an objective perspective as "shining" or "universal," and from a subjective perspective as "venerating" or even "fearing (God)." It is undoubtedly important to expound the meaning of *jing* in a dialectical relationship between the piety of believers with respect to the greatness of what is deemed the Sacred. See Donghua Zhu, "Chinese *Jingjiao* and the Antiochene Exegesis," in *The Oxford Handbook of the Bible in China*, ed. K. K. Yeo (Oxford University Press, 2021), 47–62, esp. 50–51, DOI: 10.1093/oxfordhb/9780190909796.013.9.

69 Gabriele Winkler, "Weitere Beobachtungen zur frühen Epiklese (den Doxologien und dem Sanctus): über die Bedeutung der Apokryphen für die Erforschung der Entwicklung der Riten," *Oriens christianus* 80 (1996): 177–200. See also Sebastian P. Brock, "Invocations to/for the Holy Spirit in Syriac Liturgical Texts: Some Comparative Approaches," in *Fire from Heaven: Studies in Syriac Theology and Liturgy*, ed. Sebastian P. Brock, Variorum collected studies series CS863 (Aldershot, UK: Ashgate Variorum, 2001, repr. 2006), 377–406, esp. 379.

70 Sebastian P. Brock, "The ruach elohim of Gen. 1,2 and Its Reception History in the Syriac Tradition," in *Fire from Heaven*, 327–349, esp. 329.

71 See Michael Philip Penn et al. (eds), *Invitation to Syriac Christianity: An Anthology* (Oakland, CA: University of California Press, 2022), 299. See also Ephrem the Syrian, *The Harp of the Spirit: Poems of Saint Ephrem the Syrian*, trans. Sebastian P. Brock, 3rd enlarged edn (Calgary, Canada: Aquila, 2013).

Spirit.[72] In their commentaries on Genesis, both Ephrem and Theodore understand *ruḥā* as wind/air. Their authority in the School of Edessa ensured that this view became the dominant one among pupils of that school. Not surprisingly, this became the standard understanding in the later exegetical tradition of the Church of the East from the seventh century onwards.[73] *Jingjiao*'s frequent references to *feng* (wind) might then be traced to Ephrem and Theodore's exegetical influence.[74]

Without a distinctive pneumatology in combination with Christology,[75] *Jingjiao* could not distinguish themselves from their competitors, such as Manichaeism and Zoroastrianism, because the three are recognised in lump sum as *sanyi jiao* 三夷教 (the Three Persian Religions). Both the Manichaeans and the Zoroastrians emphasised the warfare between light and darkness.[76] Xia Jinhua夏金华 even goes as far as recognising the three Persian religions' common characteristic of advocating "light."[77] If Xia is right, it also suggests that *Jingjiao*'s reason

72 Frederick G. McLeod, *Theodore of Mopsuestia*, The early church fathers (London: Routledge, 2009), 4.

73 Brock, "ruach elohim," 329–330.

74 Even though both Ephrem and Theodore (and Narsai, who is strongly under the influence of Theodore) are against interpreting the *ruḥā* (Gen 1:2) as the Holy Spirit, a case can be made that different exegetical traditions existed in the Church of the East. Besides the Acts of Thomas, mentioned earlier, the eastern recension of the Cave of Treasures identifies the *ruḥā* as the Holy Spirit. See Brock, "ruach elohim," 330–334. While translating their theological concept into Chinese, the *Jingjiao* missionaries needed to weigh these different opinions to see which one(s) could be more appropriately conveyed to the Chinese audience. The dominant Chinese metaphysical concept of *qi* was most likely a convenient way for them to associate wind with the Holy Spirit.

75 For studies of Jingjiao's Christology, see Donghua Zhu 朱東華, "'Nixiya xinjing' yu Jingjiao shenxue《尼西亞信經》與景教神學," [The Nicene Creed and Jingjiao Theology] *Logos & Pneuma* 47 (2017): 27–48; Steve Eskildsen, "Christology and Soteriology in the Chinese Nestorian Texts," in *The Chinese Face of Jesus Christ*, ed. Roman Malek (Sankt Augustin: Institut Monumenta Serica; China-Zentrum, 1991), 181–218.

76 Jinhua Xia 夏金华, "Zhonggu shiqi Sanyijiao de xiaowang yu wailai zongjiao Zhongguohua de lujing xuanze 中古时期三夷教的消亡与外来宗教中国化的路径选择," [The Demise of the Three Foreign Religions in the Medieval Times and the Choices of Sinicization] *Huadong shifan daxue xuebao (Zhexue shehui kexueban)* 华东师范大学学报 (哲学社会科学版) [*Journal of East China Normal University, Humanities and Social Sciences*] 51:1 (2019): 117–123, at 122.

77 Xia, "Zhong gu," 122. Concerning *Jingjiao*, Johan Ferreira recognises its symbolism of light in continuity with the Syriac literature. See Ferreira, *Early*

for adopting *jing* as their name cannot depend solely on its meaning of "light." Nor could it solely mean "universal," since both Zoroastrianism and Manichaeanism were considered universal religions.[78] Therefore, above all other rich meanings such as "light," "grand," and "veneration," as suggested by Zhu Donghua 朱东华,[79] I propose that *jing* also refers to the Holy Spirit and that *Jingjiao* adopts it as their sinicised name due to their strong emphasis on the Spirit. This fact can be seen not only from their theological roots in the School of Edessa (Ephrem and Theodore), but also by the Stele author's emphasis on the role of the Spirit in their theology of creation, the Spirit's production of the two breaths *yin* and *yang*, and the frequent references of *feng* to the Holy Spirit. Hence, in addition to the Luminous Religion/Teaching,[80] *Jingjiao* can be rightly translated as the Religion/Teaching of the Spirit. Furthermore, their strong pneumatological approach to the theology of creation can be called *qi*-tological due to their creative, conceptual imagination by "dancing" around the Chinese metaphysical concept of *qi*.

Chinese Christianity, 320–322.

78 Kianoosh Rezania, "'Religion' in Late Antique Zoroastrianism and Manichaeism: Developing a Term in Counterpoint," *Entangled Religions* 11:2 (2020), DOI: 10.13154/er.11.2020.8556; Jenny Rose, *Zoroastrianism: A Guide for the Perplexed* (New York: Bloomsbury Academic, 2011), 10.

79 Zhu, "Chinese *Jingjiao*," 48–51.

80 The translation of *Jingjiao* as the Luminous Religion/Teaching can be traced to Li Zhizao, who interprets *jing* 景 as "luminary." See Zhizao Li 李之藻, "Du *Jingjiao* bei hou 读景教碑后," [After Reading the *Jingjiao* Stele] in *Tian xue chu han* 天學初函, ed. Zhizao Li (Taipei: Taiwan xuesheng shuju 台湾学生书局, 1986), 82. Lin Wushu suggests that *jing* 景 was used by the Nestorian missionaries due to its similar pronunciation with "Christ" and "Catholic." See Wushu Lin 林悟殊, *Tangdai Jingjiao zai yanjiu* 唐代景教再研究 [Reexamination of *Jingjiao* in the Tang Dynasty], Tang yanjiu jijinhui congshu (Beijing: Zhongguo shehui kexue chubanshe 中国社会科学出版社, 2003), 54, n. 1. See also Wushu Lin 林悟殊, *Zhonggu sanyi jiao bianzheng* 中古三夷教辩证 [Debate and Research on the Three Persian Religions: Manichaeism, Nestorianism, and Zoroastrianism in Mediaeval Times] (Beijing: Zhonghua shuju 中华书局, 2005), 257–258. However, Wu Liwei forcefully refutes Lin's proposal due to the latter's insensitivity to the Persian language. See Liwei Wu 吴莉苇, "Guanyu *Jingjiao* yanjiu de wenti yishi yu fansi关于景教研究的问题意识与反思" [Problematics and Reflection on the Research of Nestorian Church]. *Fudan xuebao (shehui kexue ban)* 复旦学报 (社会科学版) [Fudan Journal (Social Sciences)] 53:5 (2011): 95–106, at 100–102. However, Wu does not articulate the origin of the name *Jingjiao*.

After surveying the *Jingjiao* documents, Liu Zhenning observes the writers' unparalleled preference for the word *jing*: *Jingjiao* 景教 refers to the teaching, *jingmen* 景门 to the church, *jingfa* 景法 to the religious ordinances, *jingsi* 景寺 to the religious building, *jingzhong* 景众 to the followers, *jingli* 景力, *jingming* 景命, or *jingfu* 景福 to the religious power and effect, and so on. Liu laments that we can hardly comprehend the *ming* 名 (name) of *Jingjiao*, let alone its *shi* 实 (reality).[81] Its incomprehensibility partly arises due to the scholars' relative insensitivity to *Jingjiao*'s pneumatology, and partly due to the obscurity of the documents' transformational deployment of traditional linguistic features.

Arguably, *Jingjiao* authors' creativity in their scientific and technological strategy and their *qi*-tological theology of creation can be traced to human intuition as a function of the human spirit, which is subject to the inspiration of the Holy Spirit.[82] Like Welker and Nee, Wolfhart Pannenberg also expounds on the cause of evil spirits in that "when the self-centredness of a living process dominates over the dynamic of self-transcendence, so that the living being can no longer be a member of a larger spiritual integration, the dynamic of self-transcending integration itself becomes a principle of separation and opposition."[83] Pannenberg's insight explains the nature of human spirit as a two-edged sword, in that on the one hand, "the self-centring of human egoism can turn against the life-giving working of the Spirit in an especially destructive way," but, on the other hand, "the human being is shaped by a desire for fuller participation in the Spirit, which would satisfy its hunger for wholeness and identity and bring it peace

81 Liu, *Shi yu*, 102.

82 Elsewhere, I brought Michael Welker and Watchman Nee into dialogue and argue that scientific creativity depends on the human spirit, whose primary function is intuition. See Jacob Chengwei Feng, "Addressing the Needham Question from a Theological Perspective: Toward a Chinese Theology of Holistic Wisdom," *Zygon: Journal of Religion & Science* 57:2 (2022): 299–321, at 311–312, DOI: 10.1111/zygo.12787.

83 Wolfhart Pannenberg, *The Historicity of Nature: Essays on Science and Theology* (West Conshohocken, PA: Templeton Foundation, 2008), 117–118.

with all creation."[84] Pannenberg's finding is crucial here in that human longing for scientific discovery and technological innovation is part of the human spirit's hunger and longing, the fulfilment of which "is not given to the human being in the form of a definitive possession"; it can be accomplished "only in the ecstatic experience of faith and its hope, and in the creative love that is born of such faith."[85]

George Medley III applies Pannenberg's mature theological science to inspiration. In light of Pannenberg's later description of the Spirit in terms of a dynamic field, dubbed pneumatological panentheism, Medley detects the tension in Pannenberg's understanding of inspiration when coupled with his description of the creative activity of the Spirit, namely, who is responsible for the presence (or absence) of creative beauty. Drawing on Pannenberg's commitment to the contingency of creation while arguing that creation is moving towards a definite goal (such as the Omega point), Medley proposes that the existence of creative beauty, at least human creative beauty, be viewed not as the work of either humanity or God only, but as a partnership between God and humanity, while also pursued independently by God and humanity. Medley further applies this understanding to what we mean when we declare something to be "inspired." Creative beauty of this sort, for Medley, "is fully the work of a human and fully the work of God, yet also the partnership between the two," which is "true regardless of the conscious awareness on the part of the human artist/creation" "due to the panentheistic nature of the spirit."[86]

In sum, I have presented *Jingjiao*'s highly *qi*-tological theology of creation as a pneumatological approach closely intertwined with the Chinese cosmological concept of *qi*. Furthermore, their emphasis on the work of the Holy Spirit and the Spirit's internal operation through the human spirit contributes to their creativity in mastering Greek-Byzantine science and technology and boldly presenting their

84 Pannenberg, *Historicity of Nature,* 118.
85 Pannenberg, *Historicity of Nature*, 118.
86 George III Medley, "The Inspiration of God and Wolfhart Pannenberg's 'Field Theory of Information'," *Zygon* 48:1 (2013): 93–106, esp. 99–101, DOI: 10.1111/j.1467-9744.2012.01318.x.

scientific learning and technological skills before the Tang royalty. Next, this paper evaluates *Jingjiao*'s approach, hopefully for the benefit of the contemporary global church and its worldwide mission.

Critical Lessons from *Jingjiao* for the Third Millennium

Having no precursors to follow,[87] the Assyrian Church of the East missionaries certainly achieved a high degree of success in their missionary endeavours, which can be seen in their survival for more than two hundred years. A series of factors contributed to their historic accomplishment. First, they did not reject the secular sciences of their time; instead, they took advantage of the scientific learning provided by society. Moreover, they incorporated such comprehensive learning and technological expertise in their missionary endeavour and boldly engaged with the scientifically and technologically advanced Chinese civilisation. Their active engagement with science and technology is more meaningful when compared to the mainstream contemporary Chinese theology, which, by and large, rejects theological integration with evolutionary science.[88]

Second, their *qi*-tological approach to the theology of creation results from their creative dialogue with the Chinese metaphysical concept of *qi*, a crucial concept in Chinese philosophy, religions, and medicine. By interacting with the idea of *qi*, they highlighted the ubiquitous, life-giving, and powerful nature of the Holy Spirit, and her power in intercultural and interreligious dialogues. They rightly emphasised the transcendent and immanent aspects of the Holy Spirit and the human spirit.

From the transcendent point of view, the Spirit is responsible for inspiring human intuition in both religion and science. With human

87 Xu Xiaohong traced possible Christian activities in China to the pre-Tang era. However, due to lack of hard evidence, his proposal should be treated as speculation. See Xu, "Tangdai," 25–28.

88 Elsewhere, I have observed a seventy-year gap between the Chinese theology of science and its Western counterpart. See Feng, "Addressing the Needham Question," 314.

intuition as a common field of study, Christianity, Confucianism, Daoism, and Buddhism all cultivate the "seeds" in their orientation toward the advancement of modern sciences. In their pursuit of truth, scientists, as spiritual beings, are motivated by their inner spirit. The creativity that scientists crave originates in their human intuition. From the immanent point of view, the Spirit is always at work when intuition is invoked, which results in each realisation of scientific creativity and innovation. In the universal and specific operations of the Spirit, Christ as the Word, *logos*, is indispensably at work.[89] At the same time, D'Costa is insightful in reminding us of the Spirit's call to "relational engagement" with the religious other: "If the Spirit is at work in the religions, then the gifts of the Spirit need to be discovered, fostered, and received into the church. If the church fails to be receptive, it may be unwittingly practising cultural and religious idolatry."[90]

A Chinese theology for the third millennium in particular, and Christian theology in general, will only do harm to itself by turning away from the pioneers of *Jingjiao*, who similarly lived in a techno-scientific and spirited world.

The author reports there are no competing interests to declare.
Received: 06/03/23 Accepted: 20/05/23 Published: 21/06/23

89 Jacques Dupuis, *Toward a Christian Theology of Religious Pluralism* (Maryknoll, NY: Orbis, 1997), 188–190.

90 Gavin D'Costa, *The Meeting of Religions and the Trinity, Faith meets faith* (Maryknoll, NY: Orbis, 2000), 361.

Bornavirus Genes in the Human Genome: Bringing the New from the Old

Graeme Finlay

Abstract: The genomic era has provided unassailable evidence that humans have evolved from common ancestors we share with chimpanzees and (further back in time) with all other primates and with all other mammals. One class of this evidence is the presence of ancient viral genes that were spliced into the genomes of our prehuman ancestors and transmitted to us. Retroviruses are the classical exemplar of this phenomenon, but more recently genes derived from potentially pathogenic bornaviruses have been discovered in our genome. At least two of these genes have been coopted to provide important functions. The advent of humanity, due in part to capabilities generated by random genetic mechanisms, is describable in theological terms as *creatio ex vetere*—creation of the new from the old (from stardust and antecedent species). This concept is applicable to the biblical depiction of human development, as seen in the commissioning of humanity as the image of God. Genetic changes are usually innocuous but may generate either disease or new capabilities. The cost of evolution reflects the biblical theme that suffering precedes glory, of which the history of Jesus is paradigmatic. Our biological history argues against our tendency to self-glorification—our hubris—but can be seen, from a theological point of view, to be part of the divine plan by which a redeemed and transformed humanity will be raised to share in the very life of God.

Keywords: *creatio ex vetere*; human genome; image of God; endogenous bornaviruses; evolution; suffering

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Graeme Finlay is retired from teaching scientific pathology at the University of Auckland and is a lay preacher. He has written *Human Evolution* (Cambridge University Press, 2013), *The Gospel According to Dawkins* (Austin-Macauley, 2017), *Evolution and Eschatology* (Wipf and Stock, 2021), and *God's Gift of Science* (Wipf and Stock, 2022). He is married to Jean, a musician, and they have two adult offspring.

This paper is the third in a series that reflects on the activities of semi-autonomous agents that operate within genomes and continuously modify them. These agents act as markers that establish the reality of human evolution. They clarify the way scientific concepts should be distinguished from, but may be interpreted by, theological ones. The first paper[1] shows that multispecies comparisons of genomes are analogous to textual criticism of manuscripts. Genomes and manuscripts evolve over time. The accumulation of variants (genetic and textual) delineates histories. Evolution is history, an aspect of our spacetime created reality. Creation and evolution cannot be mutually exclusive, as is often claimed. God's continual upholding of history provides a basis for the concept of *creatio continua*. The second paper[2] describes how new features arise in genomes, and how random process in the context of lawful constraints is the (God-given) means by which evolutionary change proceeds. Molecular process must be distinguished from the agency of God, which is to give being, existence. This is the basis of our understanding that divine action creates unprecedented realities (traditionally, creation from nothing), *creatio ex nihilo*.

The current paper discusses a group of genes, present in our DNA, that have been derived from pathogenic (disease-causing) viruses. They demonstrate our continuity with nonhuman mammals. The divine Son became incarnate within this biological matrix, and from it God will resurrect believing humanity at the eschaton. Such transformations relate to the theological idea of creation out of the old, *creatio ex vetere*.

1 Graeme Finlay, "Evolution as History: Phylogenetics of Genomes and Manuscripts," *Christian Perspectives on Science and Technology*, New Series 1 (2022): 150–174, https://doi.org/10.58913/JJHH2131.

2 Graeme Finlay, "Being and Becoming: The Complementarity of Creation and Evolution," *Christian Perspectives on Science and Technology*, New Series 2 (2023): 1–27, https://doi.org/10.58913/RDDN1562.

Inherited Segments of Bornavirus DNA

These are heady times for scientific pathologists. Novel pathogenic viruses affecting people are continuing to appear at regular intervals.[3] Typically, the emergent disease-causing viruses preexist in nonhuman species, in which they do not cause overt disease, and acquire the capacity to infect humans. Such nonhuman-to-human infections are said to be *zoonotic*. In quick succession, humanity has been challenged with outbreaks of Chikungunya and Zika, MERS, SARS, and COVID19, and latterly unprecedented monkeypox outbreaks. Novel strains of influenza lurk in the wings.

In parts of Germany, bornaviruses have been identified as being responsible for rare but devastating neurological disease of humans. These viruses occur naturally in shrews and (more rarely) in squirrels, in which they are nonpathogenic. But if they infect humans, they cause encephalitis (inflammation) that involves numerous regions of the brain. Encephalitis leads to death or severe permanent disability.[4] Research is afoot to discover the geographic range of this viral disease, and to ascertain whether hitherto unexplained cases of encephalitis have a bornavirus aetiology.

Surprisingly, lengths of bornavirus-derived DNA are found in the human genome—yours, mine, everyone's. We did not acquire these bornavirus genes from *infectious* viruses, but we inherited them from our parents, and they from previous generations. Genetically transmitted bornavirus genes are said to be *endogenous*, and they are added to

3 David M. Morens and Anthony S. Fauci, "Emerging Pandemic Diseases: How We Got to COVID-19," *Cell* 182 (2020): 1077–1092, DOI: 10.1016/j.cell.2020.08.021.

4 Cristina Frank et al., "Human Borna Disease Virus 1 (BoDV-1): Encephalitis Cases in the North and East of Germany," *Emerging Microbes and Infections* 11 (2022): 6–13, DOI: 10.1080/22221751.2021.2007737; Monika Huhndorf et al., "Magnetic Resonance Imaging of Human Variegated Squirrel Bornavirus 1 (VSBV-1) Encephalitis Reveals Diagnostic Pattern Indistinguishable from Borna Disease virus 1 (BoDV-1) Encephalitis but Typical for Bornaviruses," *Emerging Microbes and Infections* 12 (2023): 2179348, DOI: 10.1080/22221751.2023.2179348. It appears that the virus enters by the nose and is transmitted via olfactory neurons to deep parts of the brain.

animal genomes by a random mechanism mediated by enzymes provided by genomic parasites called *transposable elements* (Figure 1).[5]

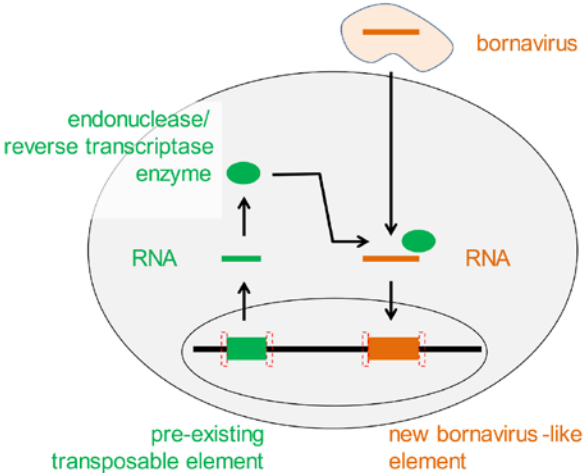

Figure 1. How endogenous bornavirus-like (EBL) elements arise

Bornaviruses lack enzymes to splice their genetic material into chromosomal DNA. Preexisting transposable elements in a cell's genome generate an RNA molecule that specifies the production of the necessary enzyme (green symbols). These enzymes may fortuitously associate (bent arrow) with one of the RNA molecules that comprises the genome of an infectious bornavirus and insert a DNA copy of the latter into the cell's genome. A hallmark of this reaction is duplicated target sites that bracket the inserted foreign DNA (red dotted boxes). If this event occurs in a reproductive cell, the randomly acquired *endogenised* bornavirus gene can be transmitted to future generations.

Given that we all possess the same set of endogenous bornaviral genetic segments, we must all be descended from individuals (more precisely, from their reproductive cells) which hosted bornavirus infections.[6]

5 For an overview see Masayuki Horie, "The Biological Significance of Bornavirus-Derived Genes in Mammals," *Current Opinion in Virology* 25 (2017): 1–6, DOI: 10.1016/j.coviro.2017.06.004.

6 Masayuki Horie and Keizo Tomonaga, "Paleovirology of Bornaviruses: What Can be Learned from Molecular Fossils of Bornaviruses," *Virus Research* 262

But when did these ancestors live? Comparative studies of the genomes of many species indicate that the most recent of these acquired segments of bornavirus DNA in the human genome are shared with (other) apes and Old World monkeys (the segments EBLN12 and EBLN22). This demonstrates that humans, other apes, and Old World monkeys are the co-descendants of the individuals (that lived about forty million years ago) in which each of the respective bornavirus DNA segments arose. We and macaques share the same ancestors. Thirteen instances of bornavirus-derived segments are shared by humans and all simian species; two are shared by all primates; and five by all Boreoeutherian mammals (which include, in addition to primates, orders such as rodents, bats, carnivores, cattle, and whales).[7] Figure 2 depicts the times at which each of twenty-two bornavirus-derived DNA segments were added to the genome we have inherited, and three others to New World monkey genomes.

What are theological implications of these endogenous bornavirus genes? When different cells or organisms share uniquely arising mutations (such as insertions of bits of bornavirus-derived DNA), we are permitted only one scientific interpretation of the data: those mutations, which arose in a single event, have been *inherited* by all the cells or organisms that now possess them. These findings alone are sufficient to demonstrate our evolutionary origins. Humans have inherited mutations that arose millions of years ago, in ancestral species that were very different from our own species. Such genetic findings establish that we are evolved organisms—we have phylogenetic continuity with all other Boreoeutherian mammals. This evidence must bring closure to decades of theologically motivated debate over our evolutionary history.[8]

(2019): 2–9, DOI: 10.1016/j.virusres.2018.04.006.

7 Junna Kawasaki et al., "100–My History of Bornavirus Infections Hidden in Vertebrate Genomes," *Proceedings of the National Academy of Sciences of the USA* 118 (2021): e2026235118, DOI: 10.1073/pnas.2026235118.

8 For the sake of focus, in this paper only three insertion mutations (Figures 3–5) have been described in detail. Millions of inserted transposable elements are shared by humans with other primates. For a study of the few (exceptional) human-specific transposable elements, see Maria V. Suntsova and Anton

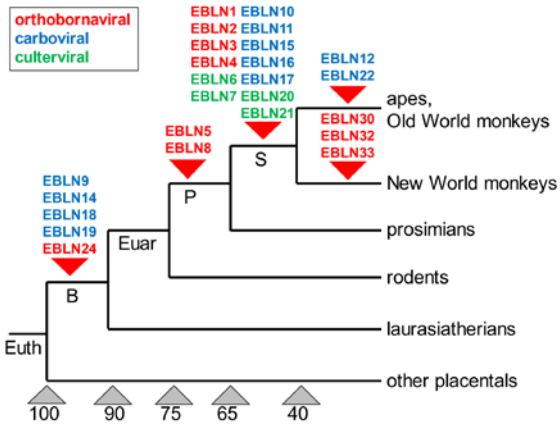

Figure 2. Times at which bornaviral genes were inserted into mammalian genomes

Colours represent three different subtypes of bornavirus. As an example of how to interpret this dendrogram, consider the bornaviral DNA segments known as *EBLN5* and *EBLN8*. These are present in the genomes of all primates but not in the genomes of any other mammals. Each segment was therefore inserted in the genome of a primate ancestor. These data establish that the primates, including humans, are *monophyletic*, descendants of the same ancestral lineage. Such lineages are given as S, simians; P, primates; Euar, Euarchontoglires (a taxon including primates and rodents); B, Boreoeutherians (the above as well as Laurasiatherian mammals that include moles and hedgehogs, bats, carnivores, hoofed animals, and whales); Euth, Eutherian, all placental mammals (including elephants and armadillos). Numerals at the bottom of the dendrogram indicate million years ago (approximately) when major splits occurred. Adapted from Kawasaki et al. (2021), Figure 3D.

A. Buzdin, "Differences between Human and Chimpanzee Genomes and their Implications in Gene Expression, Protein Functions and Biochemical Properties of the Two Species," *BMC Genomics* 21 (2020): 535, DOI: 10.1186/s12864-020-06962-8. At greater phylogenetic distances, humans share many thousands of transposable element insertions with non-primate mammals, and hundreds of more ancient transposable elements with non-mammal vertebrates. A recent study has documented 882 inserts that entered our DNA in amniote ancestors (of mammals and reptiles, as well as birds), 35 in tetrapod ancestors (of amniotes and amphibians) and eight in gnathostome ancestors (of tetrapods and fish, including sharks). See Martin C. Frith, "Paleozoic Protein Fossils Illuminate the Evolution of Vertebrate Genomes and Transposable Elements," *Molecular Biology and Evolution* 39 (2022): msac068, DOI: 10.1093/molbev/msac068.

Our evolutionary history illuminates the nature of our physical embodiment and the theological assertion that we are made of the dust of the earth[9]—the same matter as all other organisms. In scientific terms, human biology is wholly continuous with that of other animals. Our genetic connectedness suggests that many of our physical and temperamental weaknesses have deep origins in biology. Human nature is influenced by an unbroken history connecting us to our primate and other more remote biological antecedents. We need to consider our physicality very seriously, even though as spiritual beings we are qualitatively distinguished from the world of nonhuman animal nature.

In the New Testament, our physical body or *flesh* (Greek, *sarx*) may refer to the whole person in all its ambiguity, whether an individual is considered to be morally polluted or purified.[10] Our embodiment as *sarx* is subject to weakness,[11] to the effects of conflict or fear,[12] and to destructive behaviours, appetites, and instincts.[13] Our inherited *sarx*, to which reason or moral responsibility has been superadded, underlies and motivates our rebellion against God.[14] Thus, even though *sarx* refers to our normal embodiment, for Paul the term carries negative connotations, "always pulling down towards decay and death, towards the old creation which is subject to futility."[15] In John's gospel, *sarx* is impotent to transcend itself morally or spiritually.[16] The term *flesh* denotes either our biological physicality or, by extension, the whole personality of human beings as orientated to self-will and self-gratification.

Strikingly, Jesus the Messiah came to share in this anthropoid primate flesh, this fully embodied humanity,[17] the offering of which

9 Genesis 2:7; Psalm 90:3.
10 Jude 8; cf. Hebrews 9:13; J. D. Douglas et al. (eds), *The Illustrated Bible Dictionary* (Leicester: IVP, 1980), 510.
11 Matthew 26:41; Mark 14:38.
12 2 Corinthians 7:5; translated as "body," NIV.
13 Galatians 5:19–21, 24; Romans 8:5–6; Ephesians 2:3; translated as "human nature" or "natural desires," GNT; "sinful nature," NIV; "lower nature" or "carnal attitude," Phillips.
14 Galatians 5:17; Romans 8:7–8.
15 N. T. Wright, *Paul and the Faithfulness of God* (London: SPCK, 2013), 1020.
16 John 6:63; translated as "human power," GNT.
17 John 1:14; 1 John 4:2.

was redemptive for all those whose possession of *sarx* entailed entrapment in sin.[18] Redemption of our embodied being points to the mystery of God's grace, by which a particular evolved creature, deeply embedded in its biological roots, has been chosen to be liberated from its selfishness and violence, and to be destined to share in the very life and nature of God.[19]

Returning to molecular genetics, we find more surprises that have arisen from bornavirus research. One might expect that foreign segments of DNA, inserted at random into cellular genomes, would be of no use to host organisms. There is no selective pressure to maintain their protein-coding capacity, and with the passage of time they would accumulate mutations and decay into degenerated relics—as most appear to do. However, in at least two cases, particular bornavirus segments in our DNA have retained the capacity to specify the production of proteins, which now serve us, their hosts. The locations of these two genes in the human genome, called *endogenous bornavirus-like nucleoprotein 1* and *2* (*EBLN1* and *EBLN2*) have been published, and the precise sites at which they are inserted in the human and other primate genomes are compared below, using the approach described elsewhere.[20]

The genomic location at which the *EBLN1* gene resides is depicted in Figure 3. Genetic historiography reveals a wealth of detail as to how this tiny segment of genome has changed over time. Stepwise from the bottom of the diagram we may reconstruct the following sequential developments:

1. For species distantly related to us, a small segment (we could call it an "excerpt") of genetic text is shown, about 42 letters in length. Each letter represents a DNA base, the ultimate unit of hereditary information. This segment of text contains the site into which, in a later ancestor of the simian primates, the bornavirus gene was to be inserted. The uninterrupted site is preserved in prosimians (tarsiers and the aye-aye, galago and lemur

18 John 6:51–56; Ephesians 2:14; 1 Peter 3:18.
19 Galatians 2:20; Ephesians 3:19; 2 Peter 1:4.
20 Graeme Finlay, *Evolution and Eschatology: Genetic Science and the Goodness of God* (Eugene, OR: Wipf and Stock, 2021), 164–168.

group) and in some non-primates (colugos and the horse-rhino-tapir group). It could not be identified in the genomes of many distantly related mammals, in which it has presumably diverged beyond recognition, or has been deleted.

2. Using the strategies of textual criticism,[21] we can reconstruct from these variant genetic texts a single original sequence (or, as a geneticist would say, a consensus sequence). This is the sequence that would have occurred in an ancestor of primates and horses.
3. During the early history of the primates (but after the tarsier lineage diverged from that leading to simians), four letters (CATT, in red) were deleted. This produced the length of text (the reconstructed target site) into which the foreign bornavirus gene was inserted. This inferred target site has not been identified in any extant species and it has been lost from the genetic record. Only the lineage leading from the bornavirus gene insert has survived.
4. All simian primates (humans to capuchin monkeys) possess the inserted gene, although in New World monkeys (marmoset to capuchin monkey), the right hand part of the insert has undergone a deletion. The extreme left and right hand ends of the bornavirus-derived DNA are shown in orange. Hundreds of letters (bases) lie between these termini as indicated by the "…" ellipsis.

The target site (in bold and shaded) is duplicated during the insertion process, and it acts to bracket the foreign viral gene sequence. Target site duplication is a property of an enzyme called an *endonuclease/reverse transcriptase*, donated fortuitously by parasitic units of DNA that reside in the genome (Figure 1). The mechanism of the insertion, that occurred some forty million years ago, is known. This observation is important because it shows that the insertion event occurred by a familiar molecular process.[22] Natural process is God's *modus operandi* in

21 Finlay, "Evolution as History," 150–174.

22 Endonuclease and reverse transcriptase enzymes encoded by transposable

biological history. Two facts demonstrate that every species that possesses the insertion inherited it from the one cell in which it uniquely arose. First, insertion sites are selected at random in the vastness of the genome.[23] Second, the *EBLN1* insertion site is at the same location in every species in which it is found. Such a singular addition to the genome could not occur independently in more than one cell. Our evolution from a simian ancestor is confirmed.

Molecular biological research has described functions of the EBLN1 protein in human cells.[24] The protein acts to suppress the accumulation of DNA damage that occurs either spontaneously or following treatment of cells with ionising radiation (a mutagenic agent) and it provides some protection against the lethal effects of radiation on cells. The EBLN1 protein appears to be involved also in regulating the system of microtubules that act to control cell shape, the movement of intracellular components, and the separation of chromosomes when cells divide.

Proteins produced by infectious viruses act to hijack cell functions so as to produce more viruses—typically to the detriment of cells and the organisms comprised of those cells. The equivalent protein found in a contemporary infectious bornaviruses (borna disease virus nucleoprotein, BDV N) does not perform the functions that have been documented for EBLN1. The ability of EBLN1 in human cells to promote cell viability represents a gain of function. It has been coopted into a new role and acquired cell-sustaining properties. It is likely that

elements and endogenous retroviruses have been characterised in detail biochemically and structurally. See Ian Miller et al., "Structural Dissection of Sequence Recognition and Catalytic Mechanism of Human LINE-1 Endonuclease," *Nucleic Acids Research* 49 (2021): 11350–66, DOI: 10.1093/nar/gkab826; Eric T. Baldwin et al., "Human Endogenous Retrovirus-K (HERV-K) Reverse Transcriptase (RT) Structure and Biochemistry Reveals Remarkable Similarities to HIV-1 RT and Opportunities for HERV-K-Specific Inhibition," *Proceedings of the National Academy of Sciences of the USA* 119 (2022): e2200260119, DOI: 10.1073/pnas.2200260119.

23 Liliya Doronina et al., "True Homoplasy of Retrotransposon Insertions in Primates," *Systematic Biology* 68 (2019): 482–493, DOI: 10.1093/sysbio/syy076.

24 Katie N. Myers et al., "The Bornavirus-Derived Human Protein EBLN1 Promotes Efficient Cell Cycle Transit, Microtubule Organization, and Genome Stability," *Scientific Reports* 6 (2016): 35548, DOI: 10.1038/srep35548.

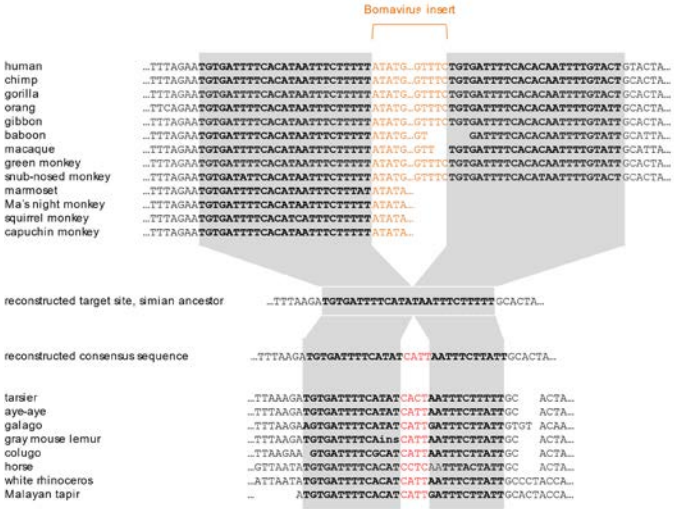

Figure 3. Insertion site of *EBLN1* gene

DNA sequences are shown for thirteen simian species possessing the insert, and for four prosimian and four non-primate species in which the undisturbed target site could be identified. The ellipsis "…" indicates that DNA sequence extends for millions of bases to the left and right of the segments shown, and (internally) for hundreds of bases comprising the bornaviral DNA insert. In this and later figures, bases shaded and in bold represent the target site and its duplications. All sequences with the undisturbed target site include four bases (typically, CATT), which must have been absent in the cell sustaining the bornaviral DNA insertion. The target site is at the upper limit of length (25 bases) generated by the endonucleases that catalyse insertion reactions, and all target site-containing sequences are of sufficient length that they can be checked directly by BLASTN. The right duplicated target site has undergone deletions in some Old World monkeys (baboon, macaque) and New World monkeys. As with other *EBLN* genes (below), the genomic location (coordinates) of *EBLN1* is from Kawasaki et al. (2021) or GeneCards (https://www.genecards.org/); the human sequence from the UCSC Browser (https://genome.ucsc.edu/cgi-bin/hgGateway), and that of other species from NCBI BLAST or BLASTN (https://blast.ncbi.nlm.nih.gov/Blast.cgi).

more molecular research will be done to catalogue how the protein has changed structurally during its residence time in primate organisms.

The insertion site of the second bornavirus-derived gene, *EBLN2*, is depicted in Figure 4. Once again, the pre-insertion (uninterrupted) target site is apparent in prosimians (tarsier, galago, lemur) and in a variety of non-primate mammals. And, as in the first case, the *EBLN2* bornavirus gene is present in New World monkeys (exemplified by the marmoset), Old World monkeys (baboon and macaque), and the apes. It was inserted into the genome of a simian ancestor.

In addition, a transposable element called an Alu element is located immediately to the right of the bornavirus insert (green text; Figure 4). Both components of the insert lie between the duplications of the target site and must have been spliced into the chromosomal DNA at the same time. One can hypothesise that the Alu element recruited the reverse transcriptase enzyme that generated the composite bornavirus-Alu insertion event. Such is a historical reconstruction of a unique molecular event that occurred at least forty million years ago. But the postulated series of events is plausible because reverse transcriptases produced by genomic parasites are still modifying our DNA and are studied in defined molecular biological systems, as noted above (n. 22).

Molecular biological research has described the function of the EBLN2 protein in human cells.[25] It has acquired the ability to localise to mitochondria, organelles that provide energy to drive cell metabolism. (The BDV N protein of contemporary infectious bornaviruses does not localise to mitochondria.) But mitochondria also control life-and-death decisions in cells, and the EBLN2 protein acts to suppress cell suicide. Like EBLN1, this protein has acquired a pro-life role, but it acts by a different mechanism.

25 Kan Fujino et al., "A Human Endogenous Bornavirus-Like Nucleoprotein Encodes a Mitochondrial Protein Associated with Cell Viability," *Journal of Virology* 95 (2021): e02030–20, DOI: 10.1128/JVI.02030-20.

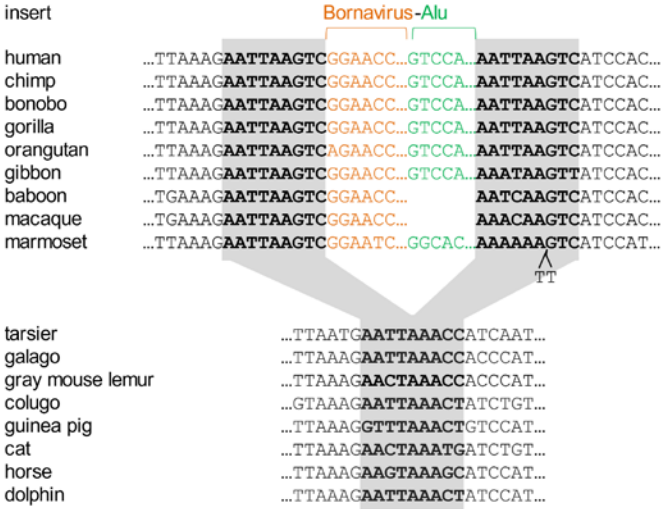

Figure 4. Insertion site of the *EBLN2* gene

DNA sequences are shown for nine simian species possessing the insert, and for three prosimian and five non-primate species in which the undisturbed target site could be identified. The first six bases of the bornavirus insert (GGAACC...) are indicated in orange and the first bases of the Alu element (GTCCA...) in green. Human genome coordinates are given in Fujino et al. (2021).

The possible activity of one other endogenous bornavirus gene has been investigated. *EBLN3P* was spliced into the primate germline in the same era as were *EBLN1* and *EBLN2* (Figure 2), and by the same mechanism (Figure 1; target site duplications are well preserved, Figure 5). However, the *EBLN3P* sequence does not specify production of a protein; it is known as a *pseudogene* (as indicated by the *P* in its symbol). The *EBLN3P* pseudogene is not totally inert. It is copied into RNA which is expressed at relatively high levels in some breast cancers (of the luminal B subtype). The presence of *EBLN3P* transcripts is associ-

ated with improved prognosis and with less invasive behaviour.[26] The reason for this association is not known. Furthermore, it has been proposed that some *EBLN3P*-derived sequences have been coopted to generate small RNA molecules (called piRNAs) that protect germline cells from invasion by infectious bornaviruses.[27] Perhaps piRNAs derived from the *EBLN3P* pseudogene act to protect male fertility.[28]

Figure 5. Insertion site of the *EBLN3P* pseudogene

In humans, a large deletion (2377 bases) exists immediately to the left of the left-hand target site duplication.

26 Carolina Mathias et al., "Unraveling Immune-Related lncRNAs in Breast Cancer Molecular Subtypes," *Frontiers in Oncology* 11 (2021): 692170, DOI: 10.3389/fonc.2021.692170.

27 Hirohito Ogawa and Tomoyuki Honda, "Viral Sequences Are Repurposed for Controlling Antiviral Responses as Non-Retroviral Endogenous Viral Elements," *Acta Medica Okayama* 76 (2022): 503–510, DOI: 10.18926/AMO/64025; citing Nicholas F. Parrish et al., "piRNAs Derived from Ancient Viral Processed Pseudogenes as Transgenerational Sequence-Specific Immune Memory in Mammals," *RNA* 21 (2015): 1691–1703, DOI: 10.1261/rna.052092.115.

28 Tomoko Takahashi, Steven M. Heaton, and Nicholas F. Parrish, "Mammalian Antiviral Systems Directed by Small RNA," *PLoS Pathogens* 17 (2021): e1010091, DOI: 10.1371/journal.ppat.1010091.

We may summarise the scientific findings hitherto. Millions of years ago, infections with potentially pathogenic bornaviruses scattered foreign bits of DNA through the genomes of our ancestors. Some of these random DNA-modifying events occurred in individuals which would prove to be the ancestors of all simian primates. In at least two cases, heritable (endogenised) inserted bornavirus genes retained the ability to produce proteins and in time acquired new functions. They were integrated into regulatory networks controlling life-and-death decisions in cells. Foreign genes have serendipitously made significant contributions to the biology and survival of contemporary *Homo sapiens*.

Humanity: Evolutionary History and Divine Creation

This snapshot of bornavirus contributions to our genome and of our "becoming" as humans invites theological interpretation. Many millions of years of our genetic history are minutely documented by the sequence of bases inscribed in our DNA, the genetic text we have inherited. Each randomly added insert has its own history (as illustrated in the cameos of Figures 3 to 5). The acquisition through evolution of functional capacities (mediated in this case by proteins and RNA molecules of bornaviral provenance) is a historical process that can be reconstructed in some detail. Christians believe that God is the sustainer of all histories, including those of biology. God has conferred upon matter the capacity to develop into organic and relational beings of extraordinary capacities. Christians should take with great seriousness what our genome tells us about our evolutionary history. More than that, it directs our worship to its divine originator and sustainer.

Creatio ex vetere: *Creation from the Old*

In *scientific* terms, humankind has been generated by a historical process, the mechanisms of which are shared with myriad other creatures and appear to be wholly unexceptional. In *theological* terms, the advent of humanity represents something qualitatively new, so that humanity

is said to be God's creation,[29] not only in the sense in which all creatures are given being, but also in the sense that humanity represents a striking innovation in the tree of life that is the object of God's moral address. Our personal capacities are genuinely exceptional. Our createdness confers upon us an inalienable dignity.

If we accept Walton's proposal that the term *creation* pertains to the conferring of new *function*,[30] then we can posit that, from a theological point of view, humanity has been created to fulfil the task of caring for God's earth and of exercising the privilege of worshiping the God to whom the world owes its existence.[31] The advent of the new entity of humanness from a long evolutionary past could be described as *creatio ex vetere*. This is creation from the old, creation from preexisting matter and from progenitor creatures (including viruses!) that lacked the more fully developed features and responsibilities that define *Homo credens*, believing humanity, the species that makes metaphysical commitments.

The creation of humanity represents a new reality in the progressive sequence of God's originating works. Another manifestation of *creatio ex vetere* is the incarnation of the divine Son, for whom a body was prepared[32] in the divine initiative that constituted the dawn of the new creation. As Adrio Konig emphasised, "the incarnation is an event of decisively eschatological character."[33] In Jesus of Nazareth, God's self-revealing Word, God lived among sinful and oppressed humanity as fully as God will live among redeemed humanity in the completed creation.[34] In Jesus we see the presence of the eternal in time.[35] To

29 Genesis 1:27; 5:1–2; 6:7; Deuteronomy 4:32; Psalm 89:47; 102:18; Isaiah 45:12, as listed by John H. Walton, *The Lost World of Genesis One* (Downers Grove: IVP, 2009), 41–44.

30 Walton, *Lost World*, 54–71.

31 Walton, *Lost World*, 68, sees "image of God" as a "functional element" of Genesis 1:26–30; see below.

32 Hebrews 10:5; and which, as Dr Murray Harris once stated (personal communication), the church should celebrate on Annunciation Day, 25 March, not Christmas.

33 Adrio Konig, *The Eclipse of Christ in Eschatology* (Blackwood, South Australia: New Creation Publications, 2007; first edn 1989), 69.

34 Konig, *Eclipse*, 71; the divine Word Jesus has dwelt (ἐσκήνωσεν; Jn 1:14) and God will dwell (σκηνώσει; Rev 21:3) among us.

35 M. Michaelis in Konig, *Eclipse*, 72.

be fully human, Jesus' body, like ours, would have been that of an anthropoid primate, complete with its retroviral and bornaviral contributions. It was *this* evolved body in which "the full content of divine nature lives."[36] It was *this* flesh-and-blood human nature that qualified him to be the high priest of mortal humanity.[37]

God's *creatio ex vetere* also pertains to the resurrection of Jesus, in which his mortal body was raised transformatively to the unprecedented state of immortality.[38] Resurrection itself represents the inauguration of a new world, a new creation: "A new world has dawned in which forgiveness of sins is not simply a private experience; it is a fact about the cosmos."[39] Human beings in their inherent territoriality and selfishness will be redeemed by Christ and transformed into a new community that bears the character of Jesus and is at home in the ecology of a new creation. Resurrection is itself a paradigmatic manifestation of the transformation of the old creation into the new. We are presented with "the already existing reality of new creation from within the old."[40] As Tom Wright states of *creatio ex vetere*: "The point of new creation is that it is the redemption and transformation of the present creation."[41]

Creation Involves the Conferral of God's Image and Likeness

The concept of *creatio ex vetere* mirrors the idea, pervasive in Scripture, of our being created in "God's image and likeness." This term carries three different referents, reflecting the climaxes of three phases of history.

First, our possession of God's image and likeness denotes our common humanity,[42] the embodied product of millions of years of evolution (including forty million years of our three endogenous bornavirus contributions) as described in what I call the "Primal Testament,"

36 Colossians 2:9 GNT.
37 Hebrews 2:14–18.
38 1 Corinthians 15:42–56.
39 N. T. Wright, *Surprised by Hope* (New York: HarperOne, 2008), 246–247.
40 N. T. Wright, *Surprised by Scripture* (London: SPCK, 2014), 203.
41 Wright, *Surprised by Scripture*, 201.
42 Genesis 1:26–27; 9:6; James 3:9.

the genome. Van Huyssteen summarises the concept of the *imago Dei* as embodied human uniqueness.[43] But when was this status acquired? Scientific humanity would like to know "when and how humans were created in God's image."[44]

This term does not refer to any one feature we possess, such as rationality, creativity, moral sense or the capacity for relationality. Rather, the image of God is said to describe our functional status;[45] it refers to our calling by God, our vocation,[46] our commissioning as God's agents on earth. To Briggs et al., it pertains to accountability or responsibility to God.[47]

The personal properties required to be God's representatives required an evolved neural substrate and the cultural underpinnings that developed over no less than 200,000 years, the age of anatomically modern *Homo sapiens*. But these were merely the prerequisite capacities needed to engage with God in the personal dimension featuring relationship and obedient service.

Humans could be said to possess God's image only when called into service as God's representatives on earth, which presupposes that they could (at least potentially) respond.[48] In this case, the concept of

43 J. Wentzell van Huyssteen, *Alone in the World?* (Grand Rapids: Eerdmans, 2006), 159–163. Scholars cited provide more specific meanings of the *imago Dei*: "a specificity gained from being addressed by God's moral word, and the ability to respond, especially in prayer" (Robert Jenson); "that which [in humans] portrays or sets forth God in the world" (Philip Heffner); a term that indicates both an *analogy* between God and humans (is *representational*) and the caring *task* entrusted to humanity by God (is *representative*) (Richard Middleton); 145–149, 156–158, 273–274.

44 Ian Hore-Lacy, review of *The Faraday Papers*, https://journal.iscast.org/book-reviews/review-the-faraday-papers.

45 Paul Copan and Douglas Jacoby, *Origins: The Ancient Impact and Modern Implications of Genesis 1–11* (New York: Morgan James, 2019), 56–58. We further read, "As God's image, we represent him and join him in his kingdom work" (64).

46 Wright, *Surprised by Scripture*, 35, 159.

47 Andrew Briggs, Hans Halvorson, and Andrew Steane, *It Keeps Me Seeking* (Oxford: Oxford University Press, 2018), 74.

48 Given that our possession of God's image is an act of grace, we should allow that *that same grace* is extended to those who, for whatever reason (age, accident, genetics) have a diminished capacity to respond to God. In such cases, we should be content to acknowledge that, as God is a mystery, so is God's image a mystery. See Janet Martin Soskice, "Imago Dei and Sexual Difference:

the *imago Dei* would arise from that phase of the *missio Dei* when God addressed human beings. The human vocation to serve God in creation is coeval with God's mission to redeem a frustrated, painfully incomplete, and suffering creation,[49] and with Israel's awareness that God's call is directed equally to all people, not merely the elite (as in pagan Mesopotamian thought).[50] Israel's horizons of the *imago Dei* encompassed the humanity Israel actually knew and was called to serve. The perspective of humanity's call should define our self-understanding, even as we have come to appreciate more the challenge of our biological (including viral) and prehistorical antecedents.[51]

A second use of the divine image pertains to the denouement of a second history—that of Abraham's family as described in the Old Testament. This history also was marked by contingency—often misused freedom, moral failure, and cataclysmic judgment. But this history was also resoundingly fruitful in that it climaxed in the advent of Jesus, who was the image of God,[52] and specifically the *express* or *exact* image and likeness of God.[53] Jesus was the perfect representation of all that humanity and Israel were intended (but failed) to fulfil. In Jesus had come at last "a truly human being … whose aim was to rehumanize other humans … and to re-establish them as what they were supposed to be."[54] Once again, the messiness of history, this time more particularly Israel's falteringly human one, has issued in a glorious advance in God's plan for his creation.

Toward an Eschatological Anthropology" in *Rethinking Human Nature: A Multidisciplinary Approach*, ed. Malcolm Jeeves (Grand Rapids: Eerdmans, 2011), 295–308, esp. 297, 325. The reality of the divine image in us is evinced by the compassion and care we show to persons with disabilities.

49 Romans 8:20.

50 Denis Alexander, *Are We Slaves to Our Genes?* (Cambridge: Cambridge University Press, 2020), 196–214.

51 Our constitution as earth, our vitality as divine breath (Genesis 2:7), our calling as image (Genesis 1:26–27), and our status before God as disobedient (Genesis 3) all describe the universal human condition. They are theological anthropology, rather than discrete events in the past. They are not physical anthropology.

52 Colossians 1:15.

53 2 Corinthians 4:4; Hebrews 1:3.

54 Wright, *Paul*, 377; also 406.

The third climax of history is described in the New Testament. The history of Jesus and his church will culminate in the conferment of the perfect image and likeness of God, as present in Jesus, upon the earthy creatures who had so faithlessly represented God hitherto: "Just as we wear the likeness of the man made of earth, so we will wear the likeness of the Man from heaven."[55] With this transformation, the earthiness of the sinful hominoid primate receives the nature of the incarnate Son of God. The new humanity will be consummately created from the old.

Potential for Evil and Good

Biological (including genetic) history witnesses to the actions of agents that exert ambiguous effects. In the short term, agents such as retroviruses and transposable elements (which acted to endogenise bornavirus RNA) are mutagens, genome disruptors, potential pathogens, and typically accumulate in the genome as junk (they are degenerative). In the long term, they can be recruited to provide essential functions, both structural and regulatory (they are generative), and they confer evolvability upon their host organisms. Bornaviruses themselves are pathogens, but have contributed to our genetic endowment. God is responsible for biological and human histories that are replete both with terrible suffering and inspiring beauty. Is God culpable for the suffering?

The potential in God's creation for good and evil is manifested also in the scientific enterprise itself. While writing this paper, I perused several publications purporting to show that an endogenous bornavirus gene performed multiple regulatory functions. However, the papers contained anomalies that cast doubt on their veracity.[56] Fraudulent publications pervade the biomedical literature.[57] If science is God's

55 1 Corinthians 15:49; also 2 Corinthians 3:18; Romans 8:29; Ephesians 4:24; Colossians 3:10–11; 1 John 3:2.

56 I have corresponded with editors of several journals, and at the time of writing await their assessment.

57 Jennifer A. Byrne et al., "Protection of the Human Gene Research Literature from Contract Cheating Organizations Known as Research Paper Mills," *Nucleic Acids Research* 50 (2022): 12058–12070, DOI: 10.1093/nar/gkac1139. The

creation, a gift of God,[58] then it is inherently good. However, the history of science, like other created histories, is ambivalent. This ambiguity arises because people may exercise their freedom to act either in ways compatible with God's wisdom (truthfully, such that science flourishes) or that contravene God's wisdom (dishonestly, such that science withers). Creation is good but the creatures (impersonal matter or personal agents, including those who would exploit science for their own nefarious ends) are free. It is necessarily free human agents, not God, who are culpable for duplicitous actions. Similarly, it is free process that has beautiful or harmful outcomes in God's good world.

This pattern is inherent to biblical history. Israel's history in the short term appeared to be a random mess, in which God's laws and spokespeople were often rejected. Israel's history seemed to end in disaster. But from the perspective of the New Testament, in the long term there was forward movement, the anticipation of deliverance, and the great culmination of God's Messiah as the paradigmatic human being, the yearned-for climax of Israel's history.[59] Jesus' own mission seemed to have been a failure—he was controverted, rejected, betrayed, crucified—but was ultimately vindicated by resurrection, which none of his followers had remotely anticipated.

Evil precedes and may be the substrate out of which good arises. The happenstance of biological evolution with its concomitant costs and gains finds a parallel with the biblical motif of suffering and glory. John's gospel takes the "suffering and glory" theme back to Jesus himself: "'That is why I came—so that I might go through this hour of suffering. Father, bring glory to your name.' Then a voice spoke from

frequency of fraudulent papers in medicine could be as high as 24%. See Jeffrey Brainard, "New Tools Show Promise for Tackling Paper Mills," *Science* 380 (2023): 568–569.

58 Graeme Finlay, *God's Gift of Science* (Eugene, OR: Wipf and Stock, 2022); David Hutchings and Tom McLeish, *Let There be Science: Why God Loves Science, and Science Needs God* (Oxford: Lion Hudson, 2017), 172, 178, 184, 188. Upon rereading Hutchings' and McLeish's book, I have wondered whether I subconsciously used as a title for my book a term they developed. If so, I belatedly acknowledge my indebtedness to them.

59 Romans 9:5.

heaven, 'I have brought glory to it, and I will do so again.'"[60] Luke quotes Jesus similarly: "Was it not necessary for the Messiah to suffer these things and then to enter his glory?"[61] And other New Testament writers recognise its validity. Paul writes: "I consider that what we suffer at this present time cannot be compared at all with the glory that will be revealed to us."[62] We cannot separate *cross* and *kingdom* motifs in the gospel of Jesus[63] any more than we can separate them in biological history.

But what about the sacrifice of numerous individuals (especially children) who have suffered genetic disease and cancers and the depredations of evolved pathogens as a result of the same processes that have led to the advent of the wonders of life and of humanity? Science suggests that the only possible world is one in which randomness and freedom operate. Polkinghorne has said that suffering and evil are the "inescapable cost" of a creation "permitted to be itself." He stated that "the possibility of cancer is the necessary price of the evolution of new life."[64] Christian cosmologist Heino Falcke has described how solar cosmic radiation is both a driver of evolution and a source of cancers. Our existence as human beings "has been earned at the cost of deep suffering. But without these potentially dangerous genetic changes, we would still be single-celled organisms."[65] As McLeish has noted, if we are to eliminate randomness by reducing the temperature to absolute zero, we necessarily eliminate life too.[66]

It may be argued logically that "the existence of good" requires "the possibility of evil." That is cold comfort. But our capacity to endure suffering is best sustained by the unconquerable divine love demonstrated in Jesus' suffering on the cross.[67] As Polkinghorne said, "God is

60 John 12:27–28.
61 Luke 24:26; described by Tom Wright as the "cross and kingdom" motif, in *How God Became King* (London: SPCK, 2012), 183–184; 139, chs 9, 10.
62 Romans 8:18; Hebrews 2:9; and the preaching (Acts 3:18 [suffering], 13 [glory]) and writing of Peter (1 Peter 1:7; 1:11; 4:13; 5:1; 5:10).
63 Wright, *How God Became King*, 159–160.
64 John Polkinghorne, *Quarks, Chaos & Christianity* (London: SPCK, 1994), 47–48.
65 Heino Falcke, *Light in the Darkness* (London: Wildfire, 2021), 25–26.
66 Tom McLeish, "Evolution as an Unwrapping of the Gift of Freedom," *Scientia et Fides* 8 (2020): 43–64, DOI: 10.12775/SetF.2020.014.
67 Robert F. L. Boyd, "The Space Sciences," in *Horizons of Science*, ed. Carl F. H.

a fellow participant in the world's suffering … This is one of the meanings of the cross of Christ."[68] Tom Wright has likewise said that the suffering of Jesus (to which his followers are called) does not merely accompany the attainment of God's purposes but is the necessary means by which they are achieved.[69] And similarly, for Jesus' followers, suffering is not merely something to be endured; it also has the "positive effect of carrying forward the redemptive effect of Jesus' own death … by sharing in it."[70] Suffering is more than a dark tunnel to be traversed *en route* to the Kingdom of God; it is the effective way of achieving the goal.[71] Questions posed currently by biological history have been addressed by salvation history.

God has compassion over all he has made.[72] Brueggemann states that "the giver of abundant life generates a world of blessing where none seemed possible." God brings life and fruitfulness out of situations within which chaos and barrenness seem to prevail, transforming "scenes of hopelessness into occasions of life, possibility, and joy."[73] When the randomness inherent to life leads to intolerable grief, people can only trust that God is just, and that God suffers with his creatures redemptively. Genuine compassion for fellow-creatures enduring afflictions that are concomitant with an evolving world should also be manifested in acts of selfless charity.

We need to be reminded of what Charles Raven wrote in 1955, when he provided a theological interpretation of the evolutionary paradigm:

> It is one of the ironies of history that Christendom which by its own Scriptures was committed to belief in an ever-working God

Henry (New York: Harper and Row, 1977), 1–20; John Houghton, *The Search for God* (Oxford: Lion, 1996), 188.

68 Polkinghorne, *Quarks*, 48.

69 Wright, *How God Became King*, 199.

70 Wright, *How God Became King*, 201.

71 Wright, *How God Became King*, 237.

72 Walter Brueggemann, *Theology of the Old Testament* (Minneapolis: Fortress, 1997), 218 (citing Ps 145:8–9).

73 Brueggemann, *Theology*, 204–205, 207.

> (e.g. John 5:17) in a progressive revelation still incomplete (John 16:13), in suffering as the characteristic of the creature (Rom. 8:18-23) and the means to perfection (Hebr. 2:10), and in fuller life as the divine purpose (John 10:10) should have so signally failed to maintain this belief when faced with the challenge of Darwinism.[74]

Hubris or Humility

Our genome is an eclectic hodgepodge of DNA from multiple sources. It seems that our lives are enriched, if not sustained, by genes contributed by potentially pathogenic viruses. Our descent from ancestors we share with monkeys is assured. Some might consider that such claims are an insult to the creator whose image and likeness we bear; and that we demean ourselves, the crown of creation.

Our heritage of viral componentry does indeed emphasise our humble origins. There is no room for hubris. But this is all part of the way by which God's ends are achieved in history. Israel was told: "The LORD did not set his affection on you and choose you because you were more numerous than other peoples, for you were the fewest of all peoples."[75] Human societies cannot abide thoughts of their own insignificance. National histories glorify their own past. Some sort of jingoism underlies tribal and national self-evaluation—hence the horrors of tribalism and nationalism. In contrast, in the (perhaps unique) case of Israel, "biblical history constantly confesses their failure as a renegade people, and glorifies the God who made something of these historical nobodies in spite of themselves and their repeated disobedience."[76]

Similarly, the first followers of Jesus in the nascent church were reminded that few of them "were wise or powerful or of high social standing," which meant that no one could boast in God's presence.[77] The church was composed of people who were spiritually dead but brought to life in Christ.[78] The great figures of Israel's and the church's

74 Charles E. Raven, *Christianity and Science* (London: Lutterworth, 1955), 31.
75 Deuteronomy 7:7.
76 Harold Turner, *The Roots of Science* (Auckland: DeepSight Trust, 1998), 78.
77 1 Corinthians 1:26.
78 Ephesians 2:1–9.

story were in themselves deeply flawed. When called by God, Moses confessed to being too halting; Isaiah, too impure; Jeremiah, too young; Peter too compromised by fear; Paul, too hostile.[79]

As noted above, we are composed of earth, humans from humus, vitality (in part) from viruses, even virulent ones. To be told that I have an ape as an ancestor on my mother's side (a point of contention in the famous Huxley-Wilberforce debate) is a mild put-down by comparison with the discovery that I am part virus. As a result of our heritage of viral flotsam, materialists may see themselves as inconsequential cosmic accidents. The late E. O. Wilson asserted that "Darwin showed that humanity is not the centre of creation, and not its purpose either."[80] But, as Gingerich observes, Darwin the scientist could not have shown this. Wilson's proposal is merely a feature of his philosophical stance or ideology. Our inestimable value is conferred upon us by God, who calls us into the service of the Kingdom of God. With Wright, Christians believe that Jesus is the one in whom God "has acted in cosmic history, human history, and Israel's history to do for Israel, humanity and the world what they could not do for themselves."[81] The whole physical universe, including its living organisms and their genetics inscribed in DNA, comes to fulfilment only in Jesus. Indeed, the totality of history, "all space, time and matter was summed up in *this* king."[82] Our value then, comes not from the raw material of which we are constituted, but from what God intends to do with it.

To conclude, scientific (genetic) research has shown that segments of bornaviral genomes have been inserted randomly into the genomes of animals. Some of these viral genes acquire new functions in the host organisms. Virus-derived genes are part of our own genetic heritage. A theological interpretation perceives that such happen-

79 Exodus 4:10; Isaiah 6:5; Jeremiah 1:6; Mark 14:71–72; 1 Corinthians 15:9; Ephesians 3:8; 1 Timothy 1:15–16.

80 In Owen Gingerich, *God's Universe* (Cambridge, MA: Harvard University Press, 2006), 98. For Wilson to raise issues like "centre of creation" and "purpose," he wanders into metaphysics. He is not speaking as a scientist. We must be alert to such covert "religious" talk by people purporting to represent science.

81 Wright, *Paul*, 684.

82 Wright, *Paul*, 731.

stance fits into a pattern, observed in biblical history—and indeed our personal histories—by which God transforms the old into the new (*creatio ex vetere*), randomness into meaningfulness, suffering into glory. Bornaviruses alert us to the earthiness of our biological origins, and to our place in a cosmic history that is both free and directed, and by which God's purposes will be realised.

The author reports there are no competing interests to declare.
Received: 17/05/23 Accepted: 21/07/23 Published: 09/08/23

An Unnecessary War: The Tragedy and Wasted Effort of the Conflict between Science and Religion

Carolyn M. King

Abstract: The supposed conflict between science and religion is widely assumed to be longstanding and inevitable, but in fact is very recent, logically invalid, and unnecessary. Science and religion belong to different domains of human experience, so each can decide only between alternative explanations offered *within* their own domain, not *across* domains. The conflict image can descend into warfare when both sides ignore the dangers of misinterpreting the logical rules of inference and of selective perception of data. The most strident voices rarely admit their mutual lack of training in the sophisticated philosophy of metaphysical reasoning and the serious literature underlying their opponents' position. Both sides base their arguments on necessarily incomplete models of invisible realities, treated as if they are as tangible as real life, so both fall into the "fallacy of misplaced concreteness." Atheists promote materialism as a simpler alternative to religion, ignoring warnings from quantum physicists that the structure of the world is increasingly mysterious, and far from simple. Science does not entail materialism. The conflict image could be defused with dignity if the opposing sides agreed to take each other seriously, consider the hierarchical structure of reality seen and unseen, and work together for the benefit of the communities of both science and religion.

Keywords: history of religion; metaphysics; models of invisible reality; philosophy of science

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Emeritus Professor and FRSNZ, University of Waikato, Hamilton, New Zealand. Holder of doctorates in science (Oxford, 1971) and religious studies (Waikato, 1999).

Modern students are often required to choose which, from among the different messages they receive from their parents and teachers, they can accept as true. In fact, the world is full of contradictory messages, confusing to adults as well. Ultimately, we all have to decide what sources of information to trust. We all have to answer the two critical questions that life throws at us: who can tell us most truthfully about how things are and which things matter? Cultural authorities once answered both questions in metaphysical terms, couched as memorable mythical stories. Now that science has taken over explaining how things are in literal terms, these and many other ancient ideas are rejected because they no longer fit reality. Rarely does any child get any help, early enough or at all, to understand the important difference between literal and mythical truth.

Metaphorical versus Literal Truth

Every human society has formulated its own set of mythical accounts of deities that determined human origins and the social consequences of divine demands for the living members of society. For example, the Hebrew scriptures claim that God formed Adam out of the dust of the earth, and that Eve was made by God out of Adam's rib. Therefore, they conclude that because the woman was made after the man, to be his helper and partner (Genesis 2:21), she should always be subject to his authority. They add that, although the human body was formed from the earth, it became alive only by the breath of God. These ancient Hebrew understandings of how things are and which things matter were the undisputed bases of Western facts and values until Copernicus (1473–1543). Since the Enlightenment, Western civilisation has discarded them, leading to a cultural crisis described by philosopher Loyal Rue as *Amythia*.[1]

Many young children, brought up in Christian households, absorb traditional stories such as those involving a talking snake in the

1 L. D. Rue, *Amythia: Crisis in the Natural History of Western Culture* (Tuscaloosa, AL: University of Alabama Press, 1989).

Garden of Eden as if they were literally true. Adults tend to regard with amusement a toddler's belief in animals queuing up to enter Noah's Ark, alongside their children's acceptance of more recent characters such as Father Christmas and the Tooth Fairy. Hence the critical groundwork of our children's earliest understanding of how things are in nature is laid on a series of recognised, tolerated falsehoods told to them in all seriousness by the people they trust. When stated so baldly, this state of affairs should be deeply shocking, and would be so, were it not so familiar and culturally accepted. When those same children get older, they meet the teaching of science in schools and universities, presented as the only true foundation of understanding the natural world. Answers to obvious questions, such as "How could the dinosaurs have fitted on to the ark?" will depend on who they ask. Parents invested in literalist interpretations of biblical stories might suggest "As eggs, of course," ignoring further questions concerning how the lions could have survived for weeks on the ark without eating the antelopes or the cattle without access to green vegetation.

Good teachers concerned to lead children towards a nonliteral understanding are more likely to describe Noah as an archetypical character, and the story of the ark as a myth. Religious myths are not falsehoods. They are stories not meant to be taken at face value, but are important because there is truth in them. C. S. Lewis referred to them as "true myths." In turn, false myths promote lies, such as those embedded in powerful Superman figures, which encourage belief in the right of the strong to impose their worldview on others by force. Interested parties confuse true myths and false myths for the purposes of dismissing the significance of the former. They claim that only the sciences have authority in establishing facts. As familiar biblical stories can no longer offer an authoritative explanation of how things are, the consequent moral implications they once carried are easily dismissed as irrelevant to contemporary society. Misunderstanding the shift in authority causes confusion, and brings traditional religion into disrepute. Cartoonists and cheerful secularists love making Noah's Ark and other biblical stories look ridiculous in the light of science.

When challenged, Christian students may feel pressured by books, teachers, or social media into making an apparently simple decision to believe either one or the other of what appear to be mutually exclusive sources of authority. This is very difficult for students from conservative backgrounds if they perceive value and personal identity in, say, both evolution and creation, and are unwilling to reject either of them. One easy response is to avoid the conflict altogether, by putting the two sets of ideas into separate boxes. Others feel driven to make a hard choice between rejecting science as threatening the established traditional ethical structure of the world—and thereby limiting their future intellectual horizons—and rejecting all religious ideas as cultural inventions irrelevant to modern thinking, thereby limiting their spiritual connections.

Creationism in Schools

How many students in Australian and New Zealand schools could be affected by the mental consequences of this dilemma? More than one might expect, concluded Ron Numbers and John Stenhouse, after conducting a detailed historical review of antievolutionism in the Antipodes. Education in both countries has always been compulsory, free and secular, but secularisation, doubled by the regress of mainstream forms of religious belief, has not been as inevitable nor as complete as might be assumed.[2] The existence of an organised entity promoting so-called "creation science" shows that, against the odds, "scientific creationism" has established a beachhead in the Antipodes.[3] In New Zealand, at least, creationism has not invaded science teaching on anything like the scale it has in the USA, but it imports many resources from there. It continues to grow in influence despite a series of official

2 R. L. Numbers and J. Stenhouse, "Antievolutionism in the Antipodes: From Protesting Evolution to Promoting Creationism in New Zealand," *The British Journal for the History of Science* 33 (2000): 335–350.

3 T. Frame, *Evolution in the Antipodes: Charles Darwin and Australia* (Sydney: University of New South Wales Press, 2009).

curriculum modifications intended to help students understand the wider implications of evolutionary theory.

Understanding Darwinian logic is essential for science students, because it is the skeleton reaching throughout our understanding of the structure of the natural world, just as the bones reach through the body of a vertebrate. Recent curriculum modifications[4] were accepted by most biology teachers as important and necessary, but they

> met some resistance from those opposed to teaching evolutionary biology on both religious and cultural grounds … [students] educated at "special character" schools rather than within the state school system can still be taught a curriculum based on a creationist worldview … [or in other schools where] relevant sections of the curriculum become "the part we don't teach."[5]

Such students are tragically ill-prepared to accept advanced biology teaching at senior level. Over more than 25 years of teaching evolutionary zoology to tertiary students I was often saddened to meet students from communities of faith who struggled to reconcile different views of the world. One that I remember especially well never missed a lecture; did all her assignments well and on time; and clearly understood the content of my teaching on evolutionary biology. In tests and exams she always knew what answers were required, and wrote them out clearly and efficiently. The science was clear in her head, but, she told a friend, who told me, in her heart she didn't believe a word of it. These issues are especially difficult for teachers in multicultural societies striving to introduce Western science to students from many different traditional backgrounds. More importantly, it seems to me essential to understand how this ancient and unnecessary war between

4 A. Campbell and K. Otrel-Cass, "Teaching Evolution in New Zealand's Schools: Reviewing Changes in the New Zealand Science Curriculum," *Research in Science Education* 41 (2011): 441–451.

5 A. Campbell, "Evolution Education in New Zealand," in *Evolution Education around the Globe*, ed. H. Deniz and L. Borgerding (Springer, 2018), 431–446 at 431.

traditional sources of authority and contemporary science arose, and how it might be defused.

Towards Mutual Tolerance

The tragedy is that there is in fact no need for any such conflict. To understand why not, we need to appreciate the history of this hoary old debate and the value and importance of respectful engagement with both sides. Both contemporary science and long-established cultural traditions understand themselves and each other in their own terms and as non-competitors. A well-informed evaluation of the literature, the historical roots, and the present significance of these ideas can help us move beyond the painful and often misinformed disputes about the important matters with which both are concerned. Science can support the intellectual enquiry, and religion the meaningful reward.[6] Incompatibility in starting points is not necessarily fatal so long as negotiation is intelligent and respectful. A naturalistic account of morality of the sociobiologist may go so far, but ultimately it cannot go as far as Christianity teaches in the name of the Lord. In turn, Christian Darwinians rejoice in the way that God has created positive ethical values through the natural processes of evolution, says Michael Ruse.[7]

A good starting point is to take ancient Hebrew philosophy seriously, not necessarily to promote biblical belief, but because its basic premises, that the world is intelligible, good, and contingent, provide the foundations of rational thought today. Contemporary science is possible only because it ultimately relies on all these statements as true.[8] Likewise, religious beliefs come in a great variety of forms, but the common grounds that ultimately unite them are more important than their differences. Intelligent faith is entirely compatible with sci-

6 J. Polkinghorne, *Science and Creation: The Search for Understanding* (London: SPCK, 1988).

7 M. Ruse, "Can a Darwinian be a Christian? Sociobiological issues," *Zygon* 35 (2000): 299–316.

8 H. Turner, *The Roots of Science* (Auckland: Deepsight Trust, 1998).

ence, when both are wisely understood.[9] Both are widely misrepresented in the media, however, as the loudest proponents of both rely on combative propaganda, rather than on respectful engagement with the other's real intentions and most thoughtful literature.

To avoid being drawn into one or other side without understanding the real issues, we need to approach each other, and our different worldviews, with great respect. That in turn requires us to understand how and why we normally make decisions between conflicting opinions, and why efforts to make truly objective conclusions are so often unconsciously sabotaged by prior experience. Our eyes are not cameras. Rather, what we can see and understand is very strongly influenced by what we already know.

Models of Invisible Realities

Reality comes in a staggering range of sizes, colours, and patterns, but we can perceive with our eyes only a small range of physical dimensions and wavelengths of the visible spectrum. So, the question is, how can we understand the things we cannot see? One answer is, by creating verbal or mathematical models to represent them. Models are defined by Arthur Peacocke[10] as imaginative human constructs, incompletely representing certain aspects of reality for particular purposes. Models allow us a glimpse of what is not observable, but because they are neither exactly real nor merely useful fictions, they must be taken seriously but not literally. The same definition is appropriate for the models used in both science and religion. All models are wrong to some extent, but some of them are useful.[11] Writers who treat incomplete models, based on abstractions, as if they were as concrete as real life, easily fall into what Alfred Whitehead called the "fallacy of misplaced concreteness."

9 I. G. Barbour, *Religion and Science: Historical and Contemporary Issues* (New York: HarperCollins, 1997).

10 A. Peacocke, *Theology for a Scientific Age*, enlarged ed. (London: SCM Press, 1993).

11 Comment attributed to the statistician George Box.

Models in both science and religion suffer from the alacrity with which their followers tend to impose their own assumptions on sources that originally meant something quite different. Both science and religion are vulnerable to what might be called the "cart-before-the-horse" syndrome, by which the meaning of a model can be completely reversed. Critical realism is needed to avoid this error and, further, to accept that models change over time as new information emerges, otherwise both sides find themselves attacking the wrong targets.[12] For example, the most common cause of misunderstanding neo-Darwinism is that people tend to think of adaptive evolution as a force, and talk of it as "driving" changes, and even of "harnessing" it. Actually, adaptive change over time is more like a cart, and the horse it follows is the differential breeding success of animals in a variable population. Adaptation is the *consequence* of natural selection, so the popular view that thinks of natural selection as a purposeful process is quite wrong—by definition, it cannot work for the good of the species.[13] A process that can be understood only backwards cannot logically be driven or used by anyone, not even by God. Misunderstanding of this crucial idea is often a key point of contention in the war between evolutionary biologists and religious fundamentalists.

In religion, in turn, there is widespread reluctance among ordinary believers to consider any scientifically informed reinterpretation of creation. This attitude is mistaken, because it prevents recognition of how much science and religion are similar under the skin. All practicing scientists have to depend on reasoned trust beyond current data, just as religious believers do. Traditional religions invest certainty and trust in mythical stories containing truths without knowledge of their veracity. Science is trust in organised knowledge without certainty, which is why we need confidence limits around scientific results.

12 C. M. King, "Models of Invisible Realities: The Common Thread in Science and Theology," in *Creation and Complexity: Interdisciplinary Issues in Science and Religion*, ed. C. Ledger and S. Pickard (Adelaide: Australian Theological Forum, 2004), 17–48.

13 The first and still clearest explanation of why not was provided by R. Dawkins, *The Selfish Gene*, second ed. (Oxford University Press, 1989).

Is There Really a War Going On, in This Day and Age?

Classical ancient societies were much more tolerant of dissent than we are. The Romans and the Greeks worshipped many different gods, in part because they did not regard any of them to be right to the exclusion of all others. The Athenians of Paul's time covered all possibilities by erecting an altar "To an unknown god" (Acts 17:23). Roman religion was polytheistic, and readily welcomed the gods of the peoples and territories they conquered. Ironically, the only religion the Romans attempted to eradicate was the one whose success their Empire made possible.[14] Contrast that enviable classical open-mindedness with the modern US, where disagreements frequently descend into a die-in-the-ditch battle between opposite positions on what the two sides take as nonnegotiable eternal truths. Popular writers eagerly describing comparable disputes between believers and secularists as a "War between Science and Religion"[15] do not realise that, amid the uproar, the intellectual content of the issues themselves often become invisible under what philosopher Mary Midgely describes as "a deep snowfall of virgin ignorance."[16] Ideologies divorced from classical theism quickly become topics of extensive and often polarising public debate on matters of moral and social significance, such as the ethical implications of genetic modification, abortion, sexual identity, and the difficulties of teaching evolutionary biology in faith-based schools. Those who know such arguments from the inside can appreciate exactly what Midgely means. Here is Alister McGrath, delivering his Inaugural Lecture on taking up the Andreas Idreos Professorship of Science and Religion at Oxford University, on 20 October 2014:

14 M. Beard, *SPQR: A History of Ancient Rome* (New York: Liveright Publishing and W. W. Norton Co., 2015), 519–520.

15 J. Hardin, R. L. Numbers, and R. A. Binzley (eds), *The Warfare between Science and Religion: The Idea That Wouldn't Die* (Baltimore: Johns Hopkins University Press, 2018).

16 M. Midgley, *Beast and Man: The Roots of Human Nature* (London: Methuen University Paperback, 1978), 14.

> This "science versus religion" narrative is stale, outdated, and largely discredited. It is sustained not by the weight of evidence, but by endless uncritical repetition, which studiously avoids the new scholarship which has undermined its credibility … the so-called "warfare" model of the relation of science and religion is a social construction of late nineteenth century Western culture, reflecting both the professional aspirations and lack of proper historical insight of that age … it is a tired and inadequate stereotype of perennial and essential hostility, which is in any case falling to pieces of its own accord, even though news of this seems to be taking more time than might be anticipated to percolate downwards.[17]

So There Is a War, but Who Is Fighting It, and Why?

The prerequisite for starting a war is that the opponents are no longer willing to listen to each other. The old rules requiring intelligent, measured, and courteous discussion ensured that the valid points of an opponent's view be at least acknowledged before its faults are criticised in impersonal, calm terms. Such civilised constraints tend to get forgotten the more the argument heats up. By the time a debate turns into outright warfare, any credit allowed to an opposing view is somehow seen as a weakness in one's own position. Therefore, to understand why the issues at stake so readily descend from discussion into outright conflict, we have to look at how each side perceives the arguments, as they themselves present them, and the reasons they are held so passionately.

Religion against the Sciences

One of the most widely recognised flash points concerns the direct contradiction between religious belief in the origins of the universe as a divine *fiat* completed in six days versus the 13.7 billion years of cosmic history described by science. They cannot both be literally true. Which, then, should be taught in schools? The fight between creation-

17 A. E. McGrath, "Conflict or Mutual Enrichment? Why Science and Theology Need to Talk to Each Other," *Science and Christian Belief* 27:1 (2015): 3–16.

ists and scientists for control of the education curriculum has, in some times and places, convulsed whole communities.[18]

The idea of religion waging a war against science is so far embedded in the popular view of the world, that uncritical commentators on both sides tend to assume it is inevitable, needs no explanation, and has been going on since time began. In fact, it is a historical artefact of surprisingly recent origin, and is not found in all religions, at all times, or everywhere. It is a recent product of materialism, the metaphysical view that only physical matter and its properties can exist. The logical implication of this view is that science can confirm the existence of only those things it can measure, which in turn defines the only questions that scientific methods can answer. Materialist ideology rejects existence of metaphysical realities, especially anything dressed up in religious attire, or purporting to detect purpose or meaning anywhere in the universe. Edward Feser calls materialism "the last superstition."[19] But materialism is not the last word on the matter. Scientism is an illegitimate extension of materialism, asserting that nothing is real, nothing *can* exist, visible or invisible, outside the purview of science. Related, hardcore materialism is a recent view favoured by secularists, as in Carl Sagan's oft-quoted phrase, "The Cosmos is all that is or ever was or ever will be."[20] The giants of early science, who established the Royal Society of London and their contemporaries who saw their work in science as following in the footsteps of God, would have been astounded by any such propositions. But they might have agreed with the implication that it is materialism, not science itself, which is the enemy of religion.

For most of the history of Western civilisation, no such view was conceivable of philosophy or theology. Within Christianity, the early church fathers of the third and the fourth centuries, who lived surrounded by tolerant pagan societies, saw no conflict between religious and secular knowledge. Augustine of Hippo (354–430), who lived

18 K. R. Miller, *Only a Theory: Evolution and the Battle for America's Soul* (New York: Viking, 2008).

19 E. Feser, *The Last Superstition: A Refutation of the New Atheism* (South Bend, IN: St Augustine's Press, 2008).

20 C. Sagan, *Cosmos* (New York: Random House, 1980), 4.

during the last days of the Western Roman Empire, had grown up with the Roman indifference to incompatible religious and secular ideas. Accordingly, he produced a series of allegorical and literal interpretations of Genesis, an attitude whose wisdom is still relevant. In the Middle Ages, Thomas Aquinas (1225–1274) integrated biblical traditions with the newly recovered Greek science. He took both Genesis and Aristotle's picture of the geocentric universe as true, fusing them into a religious cosmology emphasising an ordered world guided only by divine wisdom. The clearest description of it and its implications for the culture of his time were described by the Italian poet Dante Alighieri (1265–1321) in his masterpiece *The Divine Comedy*. This view was universally accepted until the emergence of a separate system of thought, now known as science (but then called "natural philosophy"), and has no modern equivalent except among extreme literalists.

According to Jurgen Moltmann,[21] perceptions changed after the fifteenth and the sixteenth centuries, when the revolution of thought sparked by Copernicus allowed the sciences to emancipate themselves from Aristotelian physics and cosmology. Meanwhile, theology detached its doctrine of creation from cosmology and reduced it to a personal belief in a creator rather than the things that have been created. The two disciplines established, after many struggles, their own identities on either side of accepted demarcation lines, and achieved a peaceful coexistence based on mutual irrelevance. Many would say that they still are irrelevant to one another. By contrast, one recent view asserts that it is the religious arrogance of Christianity itself that is ultimately to blame for the conflict. As John Gray put it:

> Unbelief is a game whose rules are set by believers … atheism is a late bloom of the Christian passion for truth. Christianity struck at the root of pagan tolerance of illusion. In claiming that there is only one true faith, it gave truth a supreme value that it had not had before. It also made disbelief in the divine possible for the first time. The long delayed consequence of Christian faith was an

21 J. Moltmann, *God in Creation*, trans. M. Kohl (London: SCM Press, 1985), 33–34.

> idolatry of truth that found its most complete expression in atheism … [By contrast,] the natural sciences have unveiled a universe far larger, older, and stranger than anything previously imagined … which our ancestors knew nothing about … [where] the traditional [non-Christian] spiritual connections with the more-than-human world found meaning and significance everywhere.[22]

On the one hand, this idea is superficially appealing, especially when applied to militant evangelism or, especially, politically motivated terrorism disguised in fanatical religious dress. It provides a simple explanation of how outrageous crimes justified in the name of religion, from the Crusades to 9/11, have fuelled the recent avalanche of books damning religious belief by aggressive atheists. It also encourages the flight of thoughtful believers from any form of organised religion. On the other hand, Gray's argument is undermined by a basic misunderstanding of faith, equating it with intellectual assent to irrational religious doctrines of human origin. The real definition of faith concerns trust in an unseen reality, not necessarily religious. One does not have to be religious to trust that the pilot of the plane carrying me as a helpless passenger really does know how to land safely at the right airport.

The Medieval Church Was Not Against Science Itself

Combatants more interested in fuelling the conflict than in calming it inevitably bring up the widely known (and equally widely misunderstood) stories of the battle of the medieval church against Copernicus and Galileo. In fact, in a succinct assembly of evidence contradicting the popular view, M. H. Shank shows that

> it was the early-modern Catholic church that censured Galileo, using a new literalist view of Scripture that would have surprised Augustine and Thomas Aquinas. The crude concept of the Middle

22 J. Gray, *Straw Dogs: Thoughts on Humans and Other Animals* (London: Granta Books, 2002), 19–20, 24–27.

> Ages as a millennium of stagnation brought on by Christianity has largely disappeared among scholars familiar with the period.[23]

The church's early modern reluctance towards the sciences did not draw upon the medieval Christian tradition. That said, however often the cherished myth of the medieval church's opposition to science is contradicted, it is not likely to go away. Many would see that hostility continued in the arguments surrounding the works of Darwin, Teilhard de Chardin, Hawking, and Dawkins, but without recognising either the traditional patterns that precede the modern conflict or the complex motivations behind any author's work. In a thoughtful recent analysis, Gerard Verschuuren picked five scientists, from Galileo to Dawkins, and pointed out that, in every case, the religious objections to their work arose less from their science than from their underlying interpretations.[24]

Verschuuren showed that, for church authorities, the main issues were always the possibility that some suspect ideology, incompatible with Catholic teaching, might lie hidden beneath an otherwise acceptable secular idea. Galileo's heliocentric cosmology (contradicting the church's teaching that the earth is the centre of the cosmos) was rejected for religious rather than scientific reasons. Darwin's theory of evolution was acceptable to most theologians, but his materialism was not. Teilhard was silenced for challenging established Catholic doctrines, not for his geology. The writings of modern atheists like Hawking and Dawkins stem from their materialist ideology, rather than a required conclusion of their science.

23 M. H. Shank, "Myth 2: That the Medieval Church Suppressed the Growth of Science," in *Galileo Goes to Jail and Other Myths About Science and Religion*, ed. R. L. Numbers (Cambridge, MA: Harvard University Press, 2009), 19–27.

24 G. Verschuuren, *The Myth of an Anti-Science Church: Galileo, Darwin, Teilhard, Hawking, Dawkins* (Brooklyn, NY: Angelico Press, 2018).

Science against Religion

Science, as we understand it, did not exist until the mid-nineteenth century. Until then, it was known as natural philosophy, still influenced by the strongly classical content of higher education, and most natural philosophers were ordained clergy. Some combined their work of travelling among the people of rural parishes with carefully documented observations of nature, and wrote wonderfully detailed descriptions which we still appreciate today, such as *Kilvert's Diary* and White's *Natural History of Selborne*. Some also taught classics, logic, and philosophy in long-established schools and colleges. Few of them saw any tension between their faith and the classical understanding of the secular world. The usual narratives, describing the Victorian-era encounter between traditional faith and emerging science as an inevitable turning away from religion, are an exaggeration. So, if the conflict narrative is false, where did it come from?

The Nineteenth-Century Challenge

A closer look at history suggests that the so-called "war" was an artificial "construct created by non-believers for polemical purposes."[25] Over time, it became increasingly important for scientists to assert their independence from religious institutions. T. H. Huxley made a major contribution to the idea of a conflict between faith and secular learning not because he saw that there was such a war, but because he wanted to provoke one. At a time when teaching positions at the only two universities in England were confined to ordained clergy, Huxley aspired to turn science into a profession open to atheists like himself. He needed a war that might challenge the capability of religious teachers to accept the dramatic scientific developments of their age, and so brand them as incompetent. Yet until then the new discoveries in geology and biology had been widely accepted by ministers, teachers,

25 T. Larsen, "War Is over, If You Want It," *Perspectives on Science and Christian Faith* 60:3 (2008): 147–155.

and theologians. The story of Huxley's famous encounter with Bishop Wilberforce in 1860 has passed into legend for all the wrong reasons.[26] Juicy oratory and racy rhetoric[27] allowed fading memories to make an enduring myth.[28]

In fact, the perception that science and religion were in serious dispute did not arise from the Darwinian debates of the mid-nineteenth century, but some decades later. The two foundational documents always cited in this context, Draper's *History of the Conflict between Religion and Science* (1874) and White's *A History of the Warfare of Science with Theology in Christendom* (1896), were late Victorian works of political persuasion, not history. They conveyed the impression that noble, heroic scientists were struggling against repression by odious, manipulative Catholic clergy.[29] They fostered false claims, such as that church authorities denied Columbus' assumption that the world was round, and damaging urban legends such as that the church opposed the use of anaesthetics to ease the suffering of women in childbirth.

In these and other publications, leading nineteenth-century scientists aimed to wrest cultural and professional authority away from the clergy in order to shape future intellectual enquiry and values.[30] Later scholars have pointed out that the works of both Draper and White were written, not with any real intent to present a valid idea, but with an ideological stridency undermined by historical errors and subjective reading of evidence. Unfortunately, both books gained wide influence, supporting (for example) the Soviet attempt to abolish religion in Russia. Between them they established the popular stereotype of warfare that persists among uncritical readers today.

26 J. R. Lucas, "Wilberforce and Huxley: A Legendary Encounter," *The Historical Journal* 22 (1979): 313–330.

27 For example, Huxley probably never did make the now-legendary assertion (against Bishop Wilberforce) that he was not ashamed to have a monkey for his ancestor, but he would be ashamed to be connected with a man who used great gifts to obscure the truth.

28 D. N. Livingstone, "Myth 17: That Huxley Defeated Wilberforce in Their Debate over Evolution and Religion," in *Galileo Goes to Jail*, 152–160.

29 A. McGrath, *Why God Won't Go Away* (London: SPCK, 2011), 82.

30 J. H. Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge University Press, 1991).

The New Atheists

In contemporary world, the battle has been reinvigorated by a new breed of atheists, to whom any sort of organised religion is an historic aberration, or maybe (more charitably) a phase in the continued evolution of humanity's search for itself. They see it as completely irrelevant to the modern world, except as a cheap source of social services. Sunday schools are unabashed systems of indoctrination and should be classified as child abuse, they say. To them, churches are now only empty buildings, which a few people may visit for irrational rituals of ancient origin but in which no one actually lives. Rather like museums, in fact. They promote the general assumption that materialism is a more provable explanation of the world than the unprovable idea of an unimaginably complex, omnipotent creator god. To this new breed of assertive campaigners, all and any efforts to eradicate such cultural nonsense are well justified, and after centuries of struggle and bloodshed, they suppose, the war is now nearly won.

The best known modern warriors against religious belief are a group of vociferous atheists led by Richard Dawkins, Christopher Hitchens, and Daniel Dennett. In 2006, Dawkins stepped far outside his own expertise in zoology to propose, in *The God Delusion*,[31] that it is *in principle* impossible for intelligent people to believe in God. The only rational explanation is that God is a human construct, and that science alone can explain all there is to know about the material world. Therefore, materialism is the best and the only explanation needed. The book has generated a passionate argument, from other scientists who agree that all religion is based on a dangerous delusion to people of faith who are absolutely convinced that it is not.[32]

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

32 A. McGrath, *The Dawkins Delusion? Atheist Fundamentalism and the Denial of the Divine* (London: SPCK, 2007).

Materialism Is Not as Simple an Explanation as It Might Appear

The key issue is that Dawkins and his colleagues present religion and science as alternatives. But if they understood more about the logical foundations of knowledge, they might realise that their proposition is twice undermined, because, first, the only possible opposite of religion is materialism, not science itself,[33] and second, materialism, so far from being a simple proposition able to describe all that exists, is a less reliable description of reality than is usually assumed. One of the most pithy responses came from fellow Oxford academic Keith Ward, who, tongue in cheek, almost ended the whole issue at one swipe by pointing out that Dawkins

> presents a nicely provocative argument that is well worth defending. Oxford is, after all, the home of lost causes, and it is nice to see a cause as lost as this defended … When Dawkins talks about theology, he is, on his own admission, talking about a subject that does not exist … It is a traditional definition of Oxford scholars that they know everything about nothing. So Prof. Dawkins stands in a good Oxford tradition.[34]

Militant atheists criticise the religious doctrine claiming that God—conceived as an unimaginable complex and preexisting supernatural being—was capable of creating the world, without explaining who created God. Surely, they argue, materialism must be a simpler explanation. The problem is, the more that quantum physics reveals about the structure of subatomic reality, the more the definition of matter gets mysterious. Together with it, all foundations of materialism dissolve in thin air. Ward goes on to explain why:

33 K. Ward, *God, Chance and Necessity* (Oxford: Oneworld, 1996).
34 K. Ward, *Why There Almost Certainly Is a God: Doubting Dawkins* (Oxford: Lion Hudson PLC, 2008), 8, 12.

> The world of philosophy, of resolute thought about the ultimate nature of things, is very varied … but in this world there are very few materialists … Dawkins is setting out to defend a very recent, highly contentious minority philosophical worldview … To most philosophers, materialism has looked like a non-starter. Most of us do not want to deny that material things exist. But we are no longer very sure of what "matter" is. Is it quarks, or superstrings, or the result of quantum fluctuations in a vacuum? … Quantum physicists … talk about a "veiled reality" that we can hardly even imagine, which appears as solid physical objects only when observed … There is something out there, and it appears to us as a world of fairly solid objects. But modern physics suggests that the nature of reality is very different from what we see … What is the point of being a materialist when we are not sure exactly what matter is?[35]

Here is John Haught's explanation of the underlying contradictions of Dawkins' claim that intelligent people (i.e., scientists) cannot *in principle* believe in God:

> If they [atheist critics] would stick to arguing that natural selection is an alternative to *other proposed scientific explanations* of design [in nature], biologists would remain safely outside the theological circle … Instead, they [are] insisting that natural selection is a *substitute for traditional theological accounts* … they believe that science and religious faith are locked in a contest to the death, … as *rivals* for explanatory primacy, and one of them has to lose … by putting it this way, however, they are not yet doing pure science. As a rule, competing parties have to be chasing the same goal in order for any observer to conclude meaningfully that this one rather than the other has won … If science and theology are supposed to be addressing entirely different sets of questions, it makes no sense to claim that one has defeated the other.[36]

35 Ward, *Why There Almost Certainly Is a God*, 14–15.
36 J. F. Haught, *Making Sense of Evolution* (Louisville, KY: Westminster John Knox Press, 2010), 18–19.

Alister McGrath's comprehensive survey of why attempts by atheists and agnostics to dismiss belief in God as irrational and unscientific never work is appropriately titled *Why God Won't Go Away*:

> Historians of science are generally agreed to have shown during the 1970s that the "conflict thesis" was historically untenable. The myths on which it depended so critically—especially in popular secularist propaganda— … have been comprehensively dismantled, and in recent decades popular culture has become increasingly willing to engage with the more messy complexities of history and culture instead of reducing them to mindless slogans and stereotypes … "Science" and "religion" are shorthand terms for enormously complex and diverse beliefs, practices, and communities. Crass generalisations are especially dangerous here.[37]

When challenged by well-informed critics like Midgely, McGrath, and Ward, scientists unaware of the fallacy of comparing unlike propositions, or the weakness of the materialist position, tend to be surprised to find that religion is not so easily dismissed.

Why the War between Science and Religion Is Unnecessary

In hindsight, we can see that the war between science and religion is a real but sad and unnecessary consequence of centuries of mutual suspicion and misinformation, with complicated historical roots. It is the continuation of a long-held and very serious category mistake, of confusing science and religion as *competing* explanations of reality. By exposing the philosophical confusions underlying their separate misinterpretations, and having the benefit of hindsight, we realise that the supposed warfare could be ended, if we want it to be.[38]

Wider recognition that science and religion offer complementary, not competitive, views of life could undermine the uninformed po-

37 McGrath, *Why God Won't Go Away*, 83.
38 See Larsen, "War Is over, If You Want It."

lemics of both sides.[39] Scientists who always work within the rational limitations of science offer no challenge to religion.[40] Likewise, believers with no experience of science need not worry that scientists think religious belief is irrational. They need only point out that scientists also depend on reasoned trust beyond current data, because science and religion have common—ancient and medieval—roots.[41] Science cannot reject classical metaphysics without cutting off the branch it sits on.[42]

The Tree of Knowledge

I suggest that there is a straightforward explanation for this long-standing confusion. Western readers have lost contact with the ancient metaphysical basis of knowledge, because they never encountered it. The long-continued fireworks are fuelled by the failure of modern education to introduce students to the basic ideas of the philosophy of reasoning and to the philosophy of science that underlies the daily work of all scientists. So, they are completely ignorant of the fundamental architecture of reasoning. As John Haught put it, "Everything in our experience can be explained at multiple layers of understanding, in distinct and noncompeting ways … [This idea] is an ancient one, endorsed by Socrates, Plato, Aristotle, Augustine, Aquinas, Kant, and many other great thinkers."[43] A summary of classical metaphysics would therefore be useful. In short, the two levels of reality recognised in contemporary thought are only the first and lower levels of a fourfold hierarchy.

39 K. Ward, *The Big Questions in Science and Religion* (West Conshohocken, PA: Templeton Foundation Press, 2008).

40 M. Dowd, *Thank God for Evolution: How the Marriage of Science and Religion Will Transform Your Life and Our World* (New York: Viking, 2008); Ward, *The Big Questions in Science and Religion*.

41 Barbour, *Religion and Science*; Turner, *The Roots of Science*.

42 See Feser, *The Last Superstition*.

43 Haught, *Making Sense of Evolution*, 23.

Level 1 Material Reality

Material reality is the ground level of our daily experience—measurable, touchable, temporary, and variable between measurements. The DNA molecule is a material reality, and subject to mutation, but is equivalent only to the paper on which a message is written, not the message itself.

Level 2 Information

Information is as real as is material reality, but differs from it in being invisible, and relatively permanent down a given lineage, though not immortal. It is the *order* of the bases along the DNA strand that contributes to the formulation of a gene, the information passed on to the cellular machinery, not the separate material reality of the DNA molecule itself. The message is conveyed in triplets, three-letter "words" in molecular code, which can be changed by mutations in the same way a word within a document on screen can be edited. The code is the message, and after editing carries a slightly different piece of information on the same strand of DNA. Most genetic messages are long-lived down a lineage, bar occasional mutations, which are rare especially in those controlling vital bodily functions necessary for life, like breathing. Mutational changes are interpreted and actioned by the cell, as a revised message can be printed out on a fresh piece of paper. So information is a variable construct, which will die out together with the last bodies that carry it.

Richard Dawkins points out these vital distinctions in a little-known book chapter entitled "Replicators and vehicles" (in his terms, replicators are genes, and vehicles are bodies).[44] He perceives that the two forms of reality interact in physical space. To use Aristotelian categories, genes represent potential reality, as opposed to the existing material reality of a body. Dawkins does not think of them that

44 R. D. Dawkins, "Replicators and vehicles," in *Current Problems in Sociobiology*, ed. Kings College Sociobiology Group (Cambridge University Press, 1982), 45–64.

way, but does point out an equally radical difference between them: replicators (genes) can be copied, but vehicles (bodies) cannot. Rather, all physical bodies must be reconstructed afresh every generation, only from the information held in fertilised eggs, copied from their parents. Only the body is a material, short-lived object. All bodies die, however successful. Their inheritance and their legacy consist only of information, which is copied and recopied down the generations indefinitely. Natural selection determines the differential success of variable individuals in returning copies of their genes to the species' pool.

Grasping the critical differences between these two levels of reality is essential to understand how physical evolution works. And, indeed, together they are enormously satisfying sources of explanation of the world at the sensory level, especially when allied to sophisticated mathematical models. Materialists do not see that more needs to be said. They use numerical analyses without asking where numbers come from, or why mathematics is so extraordinarily successful in explaining the workings of the universe. This, as Einstein commented, is a central mystery: Why is the universe so intelligible? We could answer this question better by retrieving the discredited ideas of the classical philosophical tradition that underlay all Western thought, from Plato, Aristotle, Augustine, and Aquinas to the Enlightenment—that a complete explanation of how things are and which things matter, in both religion and science, is knowable through the rigorous application of *reason*.

The first two levels of reality, as summarised above, can be understood through the senses, but above them are another two levels, which can be known only through the intellect.

Level 3 Universal Realities

Universal realities are preexistent; they precede any human mind, remain real and invariable whether they are ever observed or not, and (in contrast to the second level of reality, information) will still remain after the last humans have died out. They include realities that all scientists have to take for granted in their ordinary work. Numbers (e.g.,

2 + 2 = 4) have existed and been true before humans evolved and will remain true after they have all gone. The spectrum of wavelengths produced rainbows and the speed of light was the same when only dinosaurs had eyes to see them, and indeed long before the dinosaurs existed. The cosmological constants set within the first few minutes of the Big Bang have remained the same ever since. These realities are therefore not the product of human intelligence or observation. But science cannot work without them, and most scientists since the 1600s have been able to use these immutable universals only by confusing them with the quite different and variable reality of Level 2 information.

Level 4 Ultimate Reality

The ultimate reality is far above the sensory world. It can be known only to the intellect, but it explains where all the other levels of reality come from, what they are for, and supplies their standards of reference. It is the originator of all existence, life, and goodness, giving us an objective measure by which to judge the experiences and behaviour of ourselves, of everyone else, and of everything around us. It is the ultimate source of morality and faith, both grasped objectively rather than via the variable input from our senses and social environment. (N.B. "morality" in this sense is a higher level concept than "moral values," which is a subjective human idea requiring a Level 2 valuer.) Some people will identify the ultimate reality with God; materialists unwilling to allow any sort of divine foot in the door will deny that any such reality exists.

To Make Sense of Reality

An image might help translate what sound like strange ideas into a more familiar picture. Imagine a tree, a giant of the forest standing proud in a clearing, a symbol of the four levels of reality. The *roots* represent the Level 1 realities, drawing material sustenance from the soil. The *trunk* represents Level 2, the information derived from human observation

of the health and functioning of the roots, interpreted though a scientific model. Other trees draw materials from the same soil but manage them differently, which is why we can observe different species of trees growing together in the same forests.The *canopy* represents the Level 3 realities, the leaves and fruit derived from human analyses using the essential and respectful collaboration of variable information with invariable universal realities such as mathematics. Atheists do not recognise the vital difference between temporary information and immutable universal realities, so cannot see a fruitful canopy, only bare branches leading to pointless polemics like the historical war between science and religion. The *sun* above the forest represents Level 4, the source of life and energy for all forest trees, and all other living beings. Atheists cannot see it through a thick cloud of prejudice against any sort of supernatural entity.

Aristotle's famous system of four causes[45] offers a parallel set of explanations for the existence of a tree. The *material cause* is the availability of nutrients and water in the soil. The *formal cause* is the genome of the tree species that controls how those supplies are taken up and fed into the cellular machinery producing the physical structure of the tree. The *efficient cause* is the action of natural selection in choosing between variant genomes within the tree's lineage, and granting differential reproductive success to those genes most fit (i.e., most frequently copied) in a given environment. The goal of reproductive success is the *final cause* for which the tree, and all other trees, exist. Interpreted through classical theism, the final cause is the ultimate purpose of God, the reason for the existence of creation. It provides a rational explanation of nature as deriving from the love of a rational God, leading to further insights regarding "the deep intelligibility of the universe."[46] It is the rational answer to Einstein's question.

Most contemporary scientists can accept the first three Aristotelian causes, although thinking of them in different words, but the last

45 Barbour, *Religion and Science*, 5.

46 J. Polkinghorne, "Christianity and Science," in *The Oxford Handbook of Religion and Science*, ed. P. Clayton and Z. Simpson (Oxford University Press, 2006), 57–70, esp. 64.

is rejected as unscientific and unnecessary teleology. Yet, cutting off the intellectual reassurance provided by the top level of a hierarchical system of explanation converts all lower levels into mere human speculation. If more rational people could step outside their automatic rejection of metaphysical ideas that sound as ancient and irrelevant as these, we might be better equipped to see why the so-called "war" is not between science and religion as such, but between modern naturalism and the classical worldview. Naturalism, and its offspring, materialism, scientism, and secularism, undermine reason and morality, and lead to the irrational worldviews they falsely attribute to religion.

If we remove the blinkers so much beloved by the New Atheists, we might find it no bad thing to be in the company of the giants of early science on whose shoulders we stand, such as the first Fellows of the Royal Society Robert Boyle, Christopher Wren, John Ray, Isaac Newton, and many others.

Time to End the War

An armistice is a formal agreement between warring parties to stop fighting. It is not necessarily the end of a war, if hostilities are only paused while negotiators search for a solution to a continuing disagreement. But if some form of lasting peace can be found, an armistice can lay the groundwork for a real end to the war. How can we apply this idea to a strategy for ending the war between science and religion?

Take Each Other's Literature Seriously

We could start with a serious effort to explain the importance of understanding the philosophy of knowledge to all parties concerned, including bystanders. Centuries of mutual misinformation spread among the disengaged general population cannot be mended overnight. But anyone who really wants to get to grips with the literature of both sides now has a huge range of resources available, some from unexpected secular resources. For example, ecological science has long identified

the principle of competitive exclusion, whereby two or more similar species cannot survive on a single limited resource, unless they develop mutually exclusive methods of exploiting it. Two types of barnacles may compete for attachment sites on rocks, but they coexist because one grows faster near the low tide level, and the other tolerates longer exposure to air near the high tide level. Ecological principles are already influencing secular ethics and environmental management.[47]

The same principle can be applied to the debate between science and religion. Both observe the same world, but they can coexist because they ask mutually exclusive questions. Science is a system of repeatable experiments capable of proof by recurrent, knock-down testing, whereas religion is a system of metaphysical propositions best interpreted by love. Science is usually regarded as objective, and religion as subjective, although neither is purely so, and there is much overlap between them. Closer attention to the wide range of ecological texts on how different species coexist in nature could help provide examples to defuse the distressing confusion between complementary versus rival explanations.

The dispute has generated more and more thoughtful books with "God" in the title over the last two decades. Most are written by authors with a deep knowledge of and commitment to their subject, expressed in terms accessible to the nonprofessional. Many of these books stimulate, or follow, the aggressive polemics of atheists. For example, Francis Collins' 2007 reasoned defence of faith in *The Language of God* was followed by Christopher Hitchens' 2008 attack *God Is Not Great.* Daniel Dennett's 1995 dismissal of *Darwin's Dangerous Idea* misinterpreted the theory of evolution in many respects, most of them courteously corrected by John Haught in *God after Darwin* (2000) and *God and Evolution* (2006). Richard Dawkins' attacks on religion in *The God Delusion* (2006) prompted an immediate response from Alister McGrath (2007), predictably entitled *The Dawkins Delusion*. The long-running row over the

47 P. G. Fairweather, "Links between Ecology and Ecophilosophy: Ethics and the Requirements of Environmental Management," *Australian Journal of Ecology* 18 (1993): 3–19.

teaching of Darwinism in American schools is clearly explained from both points of view by Michael Dowd in *Thank God for Evolution* (2008). Jerry Coyne's opposite view is laid out in his 2015 book *Faith Versus Fact.* And there are many more. Edward Feser is astonished by "the sudden rise of ostentatious unbelief as the *de rigueur* position of the smart set … atheist chic is now, out of the blue as it were, the stuff of bestsellers, celebrity endorsements, and suburban reading groups."[48]

It is true that selective perception makes it difficult to read about, or even to understand, ideas that do not fit into one's existing mental pigeonholes. A person's core beliefs, their established view of the world and the primary support of their personal identity, must be defended against every challenge. So it takes a genuinely open mind to range across such a broad spectrum of interpretations of the one world that we all share. In turn, in the age of the internet it is no longer sufficient to hide prejudice behind either disinformation (deliberately intended to mislead) or misinformation (which could be genuinely mistaken).

Apply the Rules of Logic to Both Equally

The climate of mutual suspicion generated by the warfare model could be dispelled more readily if the outspoken advocates of conflict could be persuaded to listen to knowledgeable people on both sides, and make their responses reasonable. For example, it could be argued that Dawkins' strident trashing of all religious belief has driven an unprecedented level of reactions, both from the rational defenders of mainstream faiths, and from the outraged members of the more peripheral groups who are the primary targets of his attacks. Conversely, the anti-intellectual bias of fundamentalist groups seems to have fed directly into less than reasonable popular resistance movements against proven public health measures such as vaccination and fluoridation. Both sides could benefit by paying more attention to Sir Peter Medawar's warning that "the intensity of the conviction that a hypothesis is true has no bearing on whether it is true or false. The importance of the strength of our

48 Feser, *The Last Superstition*, xiii.

conviction is only to provide a proportionately strong incentive to find out if the hypothesis will stand up to critical evaluation."[49]

Certainly, there are aspects of religious belief accumulated over centuries which need to be pruned off, but people are already doing that—starting with Christ himself in his challenges to Jerusalem temple authorities, not to mention Martin Luther's history-changing attacks on corruption in the Roman Catholic church of his time. The advance of biblical scholarship over the last 200 years is continuing the process, although it is more visible in colleges of theology than among most congregations. Contrariwise, there are aspects of contemporary scientific culture that fully deserve criticism, especially the failure to teach students any of the basic philosophy of knowledge that could protect them from jumping to false conclusions. For example, the widespread atheist assertion that Christian faith is irrational goes back to an inductive argument somewhat along the following lines: natural science can find no rational evidence for the possibility of life after death; Christians believe in the resurrection of the dead and in many other supernatural miracles; therefore, Christian belief is irrational.

It is true that there is no scientific evidence for life after death, and also that the apparently illogical belief in supernatural events is widespread among Christians, but those premises cannot lead to a general conclusion that Christian faith is inherently irrational. Christianity also includes many other entirely rational beliefs that improve the world we live in, such as compassion for others, which is the historic basis of medieval hospitals, antislavery legislation, and many contemporary secular organisations like the Red Cross and St John Ambulance. When people from opposite backgrounds agree on how to discuss their differences with respectful attention to the rules of inference,[50] the false generalisations that feed the conflict can be disarmed.

49 P. Medawar, *Advice to a Young Scientist* (New York: Basic Books, 1979).

50 Any textbook on philosophy can explain the perils of inductive reasoning and the rules governing the derivation of conclusions by inference.

Recognise the Ways in Which Each Needs and Can Enhance the Other

One of the most respected scientists of all time, Albert Einstein, had no personal religious belief—at least, as an adult—but he had a clear grasp of why science and faith need each other. His most famous quote on the subject is best understood in its full context:

> Science can only be created by those who are thoroughly imbued with the aspiration toward truth and understanding. This source of feeling, however, springs from the sphere of religion. To this there also belongs the faith in the possibility that the regulations valid for the world of existence are rational, that is, comprehensible to reason. I cannot conceive of a genuine scientist without that profound faith. The situation may be expressed by an image: science without religion is lame, religion without science is blind.[51]

Rationalists need faith in reason, but the serious faithful also need reason to make sense of their own traditional texts and convictions. It is entirely possible to understand the story of Adam and Eve in the Garden of Eden in terms of the evolution of the human brain, for example, without rejecting its ancient interpretation of human nature as profoundly true.[52] Such an alternative explanation describing our deepest moral conflicts as natural, rather than a drastic moral failing, offers an escape from centuries of guilt and grief imposed by the religious idea of original sin. The religious message does not have to be destroyed, although when read superficially it is very frequently misinterpreted. Furthermore, in England, some of the most important religious ideas on social equality, hospitality, community care, and the treatment of criminals were astonishingly radical for their time, and secular authorities have been catching up ever since.

51 Cited in J. F. Haught, *Science and Religion: From Conflict to Conversation* (New York: Paulist Press, 1995), 44.

52 C. M. King, "Genesis 1–3 as a Resource for Twenty–First Century Faith," *Christian Perspectives on Science and Technology*, New Series, 1 (2022): 1–27.

The long rearguard action by the nineteenth-century church against the theory of evolution and all its implications is described by Mary Midgley as a

> bizarre tactical aberration … the church exhausted, distorted, and discredited itself in order to combat a quite imaginary danger. Most Christians today readily accept that the earth does not have to be in the centre of the universe, and that God, if he could create life at all, could do it just as well through evolution as by instant fiat.[53]

But, regrettably, that does not mean the end of the war. Religious warriors now target, with equal ferocity, the new issues undreamed of by our ancestors, in the fields of genetics, criminal responsibility, right-wing politics, and LGBT sexuality. We need to understand more about how to defuse such present and future disputes with understanding and compassion, starting with abolishing the metaphor of war.

One of the central problems of teaching, in both science and religion, is explaining new knowledge in contemporary terms. Ancient truths still regarded as valid in all times and places cannot be passed down from one generation to the next in their original form, as if human societies lived in a cultural vacuum. Far from it. All forms of knowledge have to be expressed in terms of culturally defined metaphors and models that speak to their present audiences,[54] as interpreted through personal experience. Cultures vary so widely that images formulated in one society quickly fall flat in a different one.[55]

There is a growing number of genuine scientists with impeccable qualifications willing to promote a more civilised conversation. For example, leading cell biologist Kenneth Miller argues persuasively that science cannot assign meaning or purpose, but that doesn't mean the world is devoid of them. "True knowledge comes only from a combina-

53 Midgley, *Beast and Man*, xix.
54 S. McFague, *Models of God: Theology for an Ecological, Nuclear Age* (Philadelphia: Fortress Press, 1987).
55 King, "Models of Invisible Realities."

tion of faith and reason."[56] In turn, theoretical physicist Sir John Polkinghorne wrote:

> We need both science and religion, and … they have many important things to say to each other … I'm driven by the need to take both science and religion seriously, and am sure that they are friends, not foes, in the common quest for knowledge … [It is not true that] religious belief is outmoded, or downright impossible in a scientific age … if people … knew a bit more about science than many of them actually do, they'd find it easier to share my view … science and faith are intellectual cousins under the skin. Both base conclusions on an interplay of interpretation and experience; both are always open to modification, both attempt to understand.[57]

Furthermore, Francis Collins, leader of the Human Genome project, pointed out that "science is the only way to answer questions about the material universe, but is powerless to answer questions about meaning. We need both, to understand both the seen and the unseen."[58] As Rabbi Jonathon Sacks put it, "Science takes things apart to see how they work; religion puts things together to see what they mean."[59] In demonstrating the interplay between random mutation and nonrandom selection, that is, between chance and law, evolutionary theory is, in Arthur Peacocke's expressive phrase, "theology's friend in disguise."[60]

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56 K. R. Miller, *Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution* (New York: Harper Collins), 267.

57 J. Polkinghorne, *Quarks, Chaos, and Christianity: Questions in Science and Religion* (London: Triangle and SPCK, 1994), xii, 11.

58 F. Collins, *The Language of God: A Scientist Presents Evidence for Belief* (London: Simon & Schuster UK, 2007), 6.

59 M. Rosenfeld, "Guardian of the Crossroads: A tribute to Rabbi Sacks" (2020), available at https://www.google.com/search?q=Guardian+of+the+Crossroads%3A+A+tribute+to+Rabbi+Sacks (accessed 20 May 2023).

60 A. R. Peacocke, "Welcoming the 'Disguised Friend': A Positive Theological Appraisal of Biological Evolution," in *Vatican Observatory/CTNS Conference* (Rome: 1996).

Indeed, religious teaching can contribute to our shared knowledge when its insights are verified by reason. For example, forgiveness of past wrongs can lead to the calming of tensions, and eventually to cooperation, as confirmed downstream by game theory[61] and social psychology. Who can forget the inspiring healing, dignified bearing of the man who lost his wife in the attack on two mosques in Christchurch, standing in court and offering forgiveness to the terrorist?

Believing people have generally been slow to realise the implications of Darwinian biology for their worldview. It is not that radical reinterpretations of old assumptions are impossible within a conservative religious organisation; liturgical reforms and feminism have made sweeping changes over the last few years, for various reasons, not all purely religious. The main trouble is that most believers do not know enough about Darwinian biology to be able to see its implications for their faith.[62] Accordingly, many tend to fear it as a rival explanation for the mystery of life. As Midgley puts it: "People's difficulty about seeing themselves as members of the one creation has come from a crude, narrow, highly abstract notion of what the other members were like."[63]

On the contrary, if the two perspectives can be seen as partners to be taken seriously, as they were in the classical tradition, there is great hope for the future. Science emphasises the dynamic aspect of evolution which creation theology had temporarily forgotten, and at the same time is raising various questions that are outside its own province to answer. Modern medical science encounters many life-or-death dilemmas where science and ethics cannot avoid meeting, and the solutions are often rooted in religious tradition. All universities and research institutions have Ethics Committees to monitor the work of their scientists in terms that ultimately go back to ancient biblical principles.

61 R. Axelrod, *The Evolution of Co-Operation* (London: Penguin Books, 1984).
62 Some examples are available online at https://www.stpeter.org.nz/god-talk (accessed 1 September 2023).
63 Midgley, *Beast and Man*, 95.

Conclusion

People willing to defend ultraconservative religious interpretations at any cost underestimate the penalties of holding on to outdated core beliefs. For example, by rejecting the overwhelming rational evidence for the global consequences of climate change and sea level rise, religious fundamentalists are not contributing to the collective action now urgently needed to protect the future habitability of our planet. In some countries, they have enough political influence to prevent real action, not because they reject the science, if they have understood it, but for other reasons, including a misplaced faith in biblical literalism, and fear of the challenge of secularism for the authority of Scripture. Like all the rest of us, they or their children will experience the consequent damage to the earth. These are dangerous attitudes to such matters, and they feed on misinformation and the bias promoted by the misuse of social media.

Until recently, the religious fightback against science searched for observations of nature that cannot be explained by science, concluding that they must therefore be evidence of the existence and creative activity of God. This approach has been a costly and distracting mistake, and its corrosive effect on faith is not yet recognised by its most committed adherents. By contrast, says Polkinghorne,

> Natural theology is less ambitious now, it does not speak of proof of God but of why theism offers the most coherent view of reality. The emphasis is not on particular cases (e.g., "irreducible" structures of the eye or the bacterial flagellum) but on the laws of nature permitting the existence of *any* cases. The details of these are acknowledged to be the domain of science, and no question that can be formulated by science should be offered a theological answer … This revised form of natural theology does not rival science on its own ground, as did Paley, but seeks to complement science by asking broader and deeper questions about intelligibil-

> ity itself … Why is science possible at all? Why is maths so unreasonably effective?[64]

Thoughtful defenders of both real science and real religion could have a greater impact if they put aside past disagreements and work together to promote more reasonable debates. This view makes a lot of sense. When do we start?

The author reports there are no competing interests to declare.
Received: 22/06/23 Accepted: 31/08/23 Published: 25/10/23

64 Polkinghorne, "Christianity and Science," 62–64.

Disentangling the Histories of Science and Religion

James C. Ungureanu

Abstract: In this review essay, I examine in detail Nick Spencer's recent book, *Magisteria: The Entangled Histories of Science and Religion* (2023). While there is much to commend in Spencer's narrative, there are some glaring omissions. These omissions can lead the reader to assess the "entangled" relationship between science and religion incorrectly, despite Spencer's promotion of a complexity thesis. This essay endeavours to disentangle the "entangled histories of science and religion." It also seeks to correct the still-common view that the "conflict" between "science and religion" first emerged during the nineteenth century. It did not. In fact, the conflict between science and religion has a long history of contending theological traditions. In short, to understand the entangled histories of science and religion one must be aware of the complex history of theological thought.

Keywords: conflict thesis; history of Christianity; nineteenth-century theology; science and religion; John W. Draper; Andrew D. White.

Dr James C. Ungureanu teaches religious studies and philosophy at The Stony Brook School, in Long Island, New York. He authored *Science, Religion, and the Protestant Tradition: Retracing the Origins of Conflict* (University of Pittsburgh Press, 2019) and coauthored *Of Popes and Unicorns: Science, Christianity, and How the Conflict Thesis Fooled the World* (Oxford University Press, 2022).

> *It is dangerous to show man too clearly how much he resembles the beast, without at the same time showing him his greatness. But it is also dangerous to show him too clear a vision of his greatness without his baseness. It is even more dangerous to leave him in ignorance of both.*

So begins Nicholas Spencer's imposing study on the "entangled histories of science and religion."[1] The quote is taken from French mathematician and philosopher Blaise Pascal (1623–1662), who, after his "memorial" religious experience in 1654, abandoned the god "of the philosophers and the scholars" for the God of Abraham, Isaac, and Jacob. Pascal sought to humble "impotent reason" and argued in his notable *Pensées* that although the human being is steeped in sin, it remains a fallen king. Humanity, according to Pascal, is thus a living oxymoron—both wretched and great.

Pascal's anthropological dualism is evident throughout Spencer's narrative. Spencer has joined a large chorus of recent work seeking to debunk the commonly held belief that "science and religion" are inherently at odds with one another. This idea, often referred to as the "conflict thesis," maintains that science and religion have always been and will always be in conflict. This is a history of war. So, in that sense, the conflict thesis is a historical argument—an argument allegedly drawn from history. Indeed, proponents of the conflict thesis argue that throughout history, religion (particularly, the Christian religion) has opposed scientific progress. They believe that Christianity was responsible for the demise of ancient Greek science, that the medieval period was an age of intellectual darkness, that Galileo was imprisoned and tortured for advancing Copernicanism, that Christian theologians opposed Charles Darwin's theory of evolution, and so on. The list seems endless.

But, according to Spencer, this conflict is a "myth."[2] The truth is much more complex, he says, if not convoluted. In a book that spans

1 Nicholas Spencer, *Magisteria: The Entangled Histories of Science and Religion* (London: Oneworld Publications, 2023).

2 Spencer, *Magisteria*, 2.

over 400 pages, he debunks myths and prejudices that have been adopted by many. In the beginning of the book, Spencer aptly outlines how historians have been rejecting such simplistic views since the 1920s. This scholarship—which includes such luminaries as Alfred North Whitehead, Pierre Duhem, and Alexandre Koyré, and more recently John Hedley Brooke, Alister McGrath, Sam Berry, Denis Alexander, and the late Tom McLeish—has "undermined many of the myths that have long disguised themselves as history in the field," he writes.[3] In reality, religion, and particularly the Christian religion, for much of its history, has actively supported, legitimised, preserved, encouraged, and developed scientific ideas and activities.[4] It is important to have a nuanced understanding of these issues, and Spencer's book is an excellent starting point for anyone interested in exploring them further.

But while he admits that "the relationship of science and religion has not only not been one of relentless conflict but has also been characterised by profitable collaboration," Spencer also contends that it has not been "a picture of unspoiled harmony." And this is where the truth of Pascal's epigraph becomes most evident. While there has been concord between the two, there has also been plenty of discord and disagreement. Spencer's aim is not simply to defend the Christian faith, but to provide a comprehensive account of the intertwined, deeply entangled relationship between science and religion—which often reflects our conflicted, Pascalian predicament. Especially important in this context is the issue of "authority," of who has the right to make pronouncements about the nature of reality and what it means to be human. Thus, Spencer's book is not merely about science and religion but about the complex (and conflicting) history of humanity itself—a history that Pascal would surely have appreciated.

Before he begins his narrative, Spencer explains the meaning behind his title. It pays homage to famous palaeontologist Stephen Jay Gould's "Non-Overlapping Magisteria," a concept which suggests that science and religion should be seen as separate domains, with science

3 Spencer, *Magisteria*, 4.
4 Spencer, *Magisteria*, 5.

dealing with empirical facts, and religion tackling moral and spiritual issues.[5] While this idea may seem appealing, Spencer points out that, in reality, humans do not always adhere to theoretical boundaries, making it difficult to implement.[6] Despite its good intentions, Gould's scheme is not entirely feasible, and thus may not be enough to prevent a conflict between science and religion. Indeed, according to Spencer, science and religion have *always* been intertwined, overlapping and influencing each other in various ways.

At its most elementary level, then, positions of either "conflict" or "concord" between science and religion are undermined by an abundance of historical evidence that precludes a complete description of how the two have interacted. The historical record, in short, reveals that the relationship between science and Christianity has always been incredibly complicated.

Early Christianity to Medieval Judaism

Spencer's account begins, naturally, at the beginning of Christianity, or at least thereabouts, with the tragic tale of the young pagan philosopher and mathematician Hypatia of Alexandria (ca. 350–370), who was brutally murdered by Christian zealots. Rather than simply debunking the myth, which was done long ago, Spencer uses the story to introduce the changing meaning of "science" and "religion." During the time of Hypatia, for instance, the "study of nature and the cosmos were entangled with the wider objects of philosophy, such as identifying the true way to life and worship," he writes.[7] Thus, science, including the science that Hypatia practised, was neither disinterested nor naturalistic. Indeed, the purpose of natural philosophy was to inform human life, ethics, religion, and politics. Spencer here is following Peter Harrison,

5 See Stephen Jay Gould, *Rocks of Ages: Science and Religion in the Fullness of Life* (New York: Ballantine Books, 1999).
6 Spencer, *Magisteria*, 11.
7 Spencer, *Magisteria*, 18.

who argues that before the seventeenth century, both *religio* and *scientia* were considered virtues rather than a set of propositional beliefs.[8]

Both Spencer and Harrison have also been influenced by the work of Pierre Hadot.[9] Hadot maintained that ancient philosophy was an art of living and a spiritual exercise, rather than what it has become in modern philosophy departments. This "entanglement" is counterintuitive to many of us, who are often trained to read philosophy as a construction of technical jargon reserved for specialists. Spencer agrees with Harrison's use of Hadot, stating that in the classical world, religion focused more on piety and correct forms of life and worship, rather than doctrine or belief.[10] While this is generally correct, it should be noted that a propositional approach to faith is not new. Read parts of the Westminster Confession or, for that matter, the Nicene Creed. Indeed, there are propositional statements throughout the biblical text. God seems to reveal himself to humanity in a number of truth statements. At the same time, it is true that equating Christian faith with *logical* propositions is something that appeared much later and reflects a climate of thought that first emerged during the late seventeenth century. More on that later.

Spencer proceeds to give a standard account of how some of the early church fathers held an ambiguous attitude toward pagan philosophy, including "natural philosophy"—what we would now call "science." Many refer to Tertullian's (160–220) famous rhetorical questions, "What indeed has Athens to do with Jerusalem? What concord is there between the Academy and the Church?"[11] Tertullian, however, was not a radical anti-intellectual. His writings reveal that he was superbly educated in the Graeco-Roman classical tradition, and that his argument

8 Peter Harrison, *The Territories of Science and Religion* (Chicago: University of Chicago Press, 2015).

9 Pierre Hadot, *Philosophy as a Way of Life: Spiritual Exercises from Socrates to Foucault* (London: Wiley, 1995); *What is Ancient Philosophy?* (Cambridge, MA: Belknap Press, 2004).

10 Spencer, *Magisteria*, 20.

11 See Tertullian, "The Prescription Against Heretics," in *The Ante-Nicene Fathers*, vol. 3, ed. Alexander Roberts and James Donaldson (Peabody, MA: Hendrickson, 1996).

against pagan philosophers was actually built out of the materials and the methods drawn from that same tradition. Patristic scholars have long pointed out that the early church fathers did not renounce all contact with Graeco-Roman ideas. Different though Christians were from pagans in religious belief, there was a large and important area of political and philosophical knowledge that they held in common.[12]

Looking closely at the attitudes within the early church, it becomes clear that there was a range of reactions to pagan philosophy. Most of the church fathers were, after all, adult converts who had received their education in pagan schools. As they worked to elaborate on and defend Christian doctrine, it was expected that they would utilise the tools of the classical tradition and its philosophical content. Although Tertullian himself was not particularly fond of pagan philosophy, including natural philosophy, authors such as Justin Martyr (100–165), Clement of Alexandria (155–220), and Origen of Alexandria (185–251) adopted an eclectic mix of classical philosophies, including Platonism, Neoplatonism, and Stoicism.

This ambiguity leads Spencer to reject notions of "concordism," a position which seeks harmony between science and religion. Since *scientia* or "science" has never been a fixed and unchanging category, building religious structures on knowledge of nature is a precarious situation indeed. Before showing just how precarious such endeavours can be, Spencer reports that the same ambiguity existed among Islamic and Jewish scholars. "From the ninth century onwards," Spencer writes, "Islamic territories … boasted scientific thought and achievements that matched anything in the classical world."[13] Particularly important was the Abbasid caliphate in Baghdad. As with the church

12 On revising our understanding of Tertullian, see, e.g., Justo L. González, "Athens and Jerusalem Revisited: Reason and Authority in Tertullian," *Church History* 43:1 (1974): 17–25; Eric Osborn, *Tertullian: First Theologian of the West* (Cambridge University Press, 2002). See also more general studies by A. H. Armstrong and R. A. Markus, *Christian Faith and Greek Philosophy* (London: Darton, Longman & Todd, 1960) and Jaroslav Pelikan, *Christianity and Classical Culture: The Metamorphosis of Natural Theology in the Christian Encounter with Hellenism* (New Haven: Yale University Press, 1995).

13 Spencer, *Magisteria*, 33.

fathers, however, there were some in the Islamic world that resisted classical philosophical speculations. The Umayyad caliphate, based in Damascus, for instance, was indifferent to classical learning. But when the Umayyad were overthrown during the Abbasid revolution, Islam changed culturally and adopted the Persian sciences. Known as the "Golden Age of Islam," Abbasid scholars translated numerous Greek texts, adopting and adapting many of its ideas into Islamic theology.

But, again, the story is complicated. During the caliphate of Abu al-Abbas Abdallah ibn Harun al-Rashid (786–833), mostly known as al-Ma'mun, the caliph ordered the construction of the first astronomical observatory in Baghdad. He was a keen supporter of Mu'tazila, a rationalist tradition of theology that championed reasoned inquiry. The Mu'tazila, however, were often violently opposed to more conservative religious scholars. Unsurprisingly, there was a conservative backlash to this persecution. Later, al-Mutawakkil (822–861) discarded the Mu'tazila and the rationalistic approach to theology. Thus the ambiguous character of Islam and science aptly reflects Spencer's guiding question—"where did intellectual authority reside?"[14] While al-Ghazali (1058–1111) proclaimed the *Incoherence of the Philosophers* during the early medieval period, Ibn Rushd, or Averroes (1126–1198), condemned the *Incoherence* as "incoherent." What is more, a host of cultural, economic, and social factors played a role in why there was no "Islamic scientific revolution," including forces outside of Arabic-speaking lands. Unfortunately, Spencer does not give more specific examples other than following Toby Huff's argument, that unlike medieval Europe the Islamic world failed to secure an *institutional* setting for the practice of science, the result leading ultimately to the decline of the sciences in Arabic-speaking countries.[15]

14 Spencer, *Magisteria*, 42.

15 Toby Huff, *The Rise of Early Modern Science: Islam, China, and the West* (Cambridge University Press, 2003). While Huff's work is excellent, one should also read, in conjunction, the studies by David C. Lindberg, *The Beginnings of Western Science* (University of Chicago Press, 1992), Edward Grant, *The Foundations of Modern Science in the Middle Ages* (Cambridge University Press, 1996), Marcia L. Colish, *Medieval Foundations of the Western Intellectual Tradition, 400–1400* (New Haven: Yale University Press, 1997), and Muzaffar Iqbal, *Science*

If his chapter on Islam and science feels somewhat incomplete, Spencer's examination of Judaism and science feels more so. This observation is not so much a criticism as a need to pursue other work more focused on this line of enquiry. For his part, Spencer does note that many of the church fathers followed Philo of Alexandria (20 BC–AD 50) and his belief that the classical philosophy can serve as a "handmaiden" to theology. Spencer also helpfully points out that after the first century, Jews have mostly lived as the "other," whether under Christendom or Islamic rule. Thus, in order to understand Judaism and its relationship with the sciences, one must examine the "plural context" of its history. Here, as in the early Christian church and medieval Islam, ambiguity reigns. The rise of Karaite Judaism during the seventh and ninth centuries, for example, rejected the discursive and circuitous approach of the rabbis in reading Scripture and Talmudic studies.[16] Indeed, according to Spencer, the "inherently dialogical and disputative nature of the Talmud" resulted in an even more complex, ambiguous, and argumentative relationship with the sciences. During the medieval period, Maimonides (1138–1204) "sought to bring theology into harmonious dialogue with Greek philosophy and science."[17] Where there was conflict, he offered a "doctrine of accommodation," which later Christian natural philosophers would also follow.

Christendom, University Culture, and the Sciences

Having only hinted at the complex relationship between Islam, Judaism, and science, Spencer returns to what he is most familiar with: Christendom and the sciences. The classical antiquity had bestowed on Christianity a vast heritage of philosophical speculation, much of which was absorbed in the metaphysical framework underlying early and medieval Christian thinking. While popular historical accounts tend to portray medieval Christians as philistine, suspicious of learn-

and Islam (Westport, CT: Greenwood Press, 2007).

16 Spencer, *Magisteria*, 53.

17 Spencer, *Magisteria*, 58.

ing, the truth is that the classical tradition of philosophy, art, literature, and the natural sciences was kept alive largely by Christians in monastic communities.[18] There were numerous writers of great influence from late antiquity and the early medieval period who bridged classical and Christian worldviews. Philo's "handmaiden" formula continued to sanction the pursuit of studying nature, but some writers began going beyond its original religious or theological intent.

As monasticism matured in the following centuries, its store of scientific knowledge increased. Western monasteries would engender cathedral schools, and these schools eventually grew to become the great universities of Bologna, Paris, Oxford, and Cambridge in the thirteenth century. The university quickly became the centre of intellectual and literary life, offering advanced religious, professional, and scientific education. As a repository of learning and philosophical speculation, several features of these new universities are important for understanding the development of the sciences. First, as we have already mentioned, the universities of the late medieval period were instrumental in the recovery and translation of Latin, Greek, and Arabic classics. These newly recovered and translated texts took their place alongside sacred writings and the works of the church fathers.

The second feature of the new universities was a remarkable rationalistic turn, in the sense that students were required to apply their minds and energies to a number of discursive subjects, from law, philosophy, and theology to the study of nature. This method of learning came to be called "scholasticism," where students and their masters employed dialectical reasoning, approaching any fields of study in terms of sets of propositions, problems, arguments, and counterarguments. Scholasticism can be seen as an attempt to reconcile the philosophy of Greek and Arabic thinkers with medieval Christian theology. It is not a philosophy or theology in itself, but an instrument and method for learning, which emphasised rationality. The primary purpose of scholasticism was to find the answer to a question or resolve a contradiction.

18 See, e.g., the accessible treatment of James Hannam, *God's Philosophers: How the Medieval World Laid the Foundations of Modern Science* (London: Icon Books, 2009).

But perhaps the most important feature of the new university was its corporate structure. The separation of church and state is not merely an American phenomenon; its roots actually appear in the structure of the medieval university of Western Europe. Corporate structure in turn gave the masters of the universities great autonomy in structuring curriculum and lessons for their students. The revolutionary transformation and development of legal systems that took place in the eleventh, twelfth, and thirteenth centuries in Western Europe provided new levels of autonomy and jurisdiction to the masters of the universities.

In short, the medieval university scholar is best characterised as an "organiser, a codifier, a builder of systems," as C. S. Lewis aptly put it.[19] Distinction, definition, and tabulation was the delight of medieval scholars. Highly sophisticated and complex philosophical speculations were framed within rigid dialectical patterns copied from Aristotle's rhetoric. The philosophers and the theologians at those, mainly autonomous, universities freely debated a wide range of scientific and theological questions. The task was to master a body of knowledge, astonishing in breadth and depth, to assess its compatibility with a systematic Christian theology, and to appropriate it for religious purposes. From these medieval universities emerged brilliant theologians and philosophers like Peter Abelard (1079–1142), William of Conches (1090–1155), Peter Lombard (1096–1160), Robert Grosseteste (1168–1253), Albertus Magnus (1200–1280), Roger Bacon (1214–1292), Thomas Aquinas (1225–1274), and many others. These great medieval Christian thinkers, Spencer observes, formulated "a formidable set of theological justifications and tools for the systematic study of nature and the cosmos."[20]

But herein lies a danger as well. Among these thinkers we begin to see attempts at moving beyond the patristic "handmaiden" model. Roger Bacon, for instance, a Franciscan monk who is often considered the "first true scientist" of the Middle Ages, argued that the theologians of his day *must* use the new learning in order to understand Christian-

19 C. S. Lewis, *The Discarded Image: An Introduction to Medieval and Renaissance Literature* (Cambridge University Press, 1964), 11.

20 Spencer, *Magisteria*, 68.

ity itself. Bacon believed there were certain obstacles, or errors, that prevented theologians of his day from attaining total truth. Tellingly, the first of these was "submission to faulty and unworthy authority." In order to expose and refute errors, Bacon relied not only on Scripture and the church fathers, but also Greek, Roman, and Arabic philosophers. In short, Bacon's entire explanation of the causes of error boils down to his evident interest in the new learning and his fear that orthodox opinion would inhibit freedom of thought. Bacon thus pushed for a new understanding of the "handmaiden" tradition, one that went beyond being merely sympathetic to pagan philosophy, as the patristic authors had done.[21]

Some of these details are missing from Spencer's account. Nevertheless, he notes that this more rationalistic (or "naturalistic") attempt to describe nature led to the questioning of miracles. It also led to the questioning of Scripture—or, at least, how it should be interpreted. Some of these medieval thinkers concluded that Scripture could not adequately explain nature. Indeed, "it was fundamentally uninterested in the mechanism of nature," as Spencer explains. This was, in short, incipient "methodological naturalism," the belief that nature proceeded along secondary or natural causal lines and should be studied accordingly.[22]

Translation of Aristotle's works played a significant role in these changes. Thomas Aquinas, the famed Dominican friar who taught theology at Paris, was particularly influenced by the Greek philosophy of Aristotle. His best-known work, the *Summa Theologiae*, reflects a careful and considerable compromise between Aristotelian philosophy and Christian theology. According to Thomas, God is the "primary

21 See Brian Clegg, *The First Scientist: A Life of Roger Bacon* (London: Constable & Robinson Ltd., 2003).

22 The historical relationship between the rise of biblical criticism and the science–religion debate has yet to be told in great detail, but a good starting point is Klaus Scholder's *The Birth of Modern Critical Theology: Origins and Problems of Biblical Criticism in the Seventeenth Century* (London: SCM Press, 1990). See also my forthcoming article, "Interpreting God's 'Two Books': Isaac Newton's Hermeneutics of Nature, Scripture, and History," to appear in *Theology & Science*.

cause" of everything. While creation depends on divine activity, and is thus "secondary" in this sense, God empowered creation to act on its own accord. Thomas argued that God gives created things active and passive causal powers of their own—that is, creation has the capacity to affect other things and to be affected by them. God may be the primary cause who directly sustains the existence of everything, but he chooses to act indirectly through the operation of the created order. God therefore can only act by means of the order of nature to produce effects in the world.[23]

This distinction between primary and secondary causes led Thomas to make important distinctions between philosophy and theology as well. Fully acquainted with the science and philosophy of his day, Thomas argued that empirical science studies the nature and activity of secondary causes, whereas metaphysics and theology study divine action and the spiritual dimension of the human being. "Revealed" theology, Thomas argued, is based on divine revelation, whereas "natural" theology is based on what could be discovered, understood, and demonstrated by human reason alone. Thomas' various distinctions, however, particularly his separation of theology from natural philosophy, faith from reason, could lead to the belief, as we shall see, that science and religion are ultimately incompatible. Thus, while he was careful to note that "all truth was God's truth," Thomas' approach opened the way to viewing science and religion as two separate truths.[24]

In sum, for the first time in history a culture supported universities, permanent institutions dedicated to the intellectual life that equipped hundreds of thousands of students epistemologically, methodologically, and mathematically to investigate the nature of the cosmos. Most of the universities had the support of patrons, and by far the greatest patron of the medieval university was the church. As histori-

23 See *St Thomas Aquinas: Summa Theologiae: A Concise Translation*, ed. Timothy McDermott (Notre Dame, IN: Ave Maria Press, 1989).

24 On the philosophical and theological work of Aquinas, see Rudi Te Velde, *Aquinas on God: The 'Divine Science' of the* Summa Theologiae (Burlington, VT: Ashgate, 2006). See also Brian Davis (ed.), *The Oxford Handbook on Aquinas* (Oxford University Press, 2012).

an John Heilbron observes, "the Roman Catholic Church gave more financial and social support to the study of astronomy for over six centuries, from the recovery of ancient learning during the late Middle Ages into the Enlightenment, than any other, and, probably, all other, institutions."[25] To be sure, while some theologians worried about the theological dangers of higher education, they were nevertheless aware of its practical and scientific benefits, to the point of protecting and supporting these institutions.

The Dawn of Scientific Naturalism

At the same time, conceding such autonomy to natural revelation had the unintended consequence of enabling it to compete with and even supersede special revelation as a basis for authority. Scientists will begin to see naturalism in contrast to supernaturalism. Belief in the supernatural or divine providence will be seen as actually diminishing or opposing the integrity of the natural. The implication is that revelation is no longer necessary. The recognition of a revelation—coming from above and educating humanity in discerning ways which are higher than our ways, and thoughts which are higher than our thoughts—will come to be seen by many in the proceeding generation as entirely superfluous, even gratuitous.

Such dangers were recognised by Bonaventure (1221–1274), for instance, who was considerably influenced by the patristic approach to natural philosophy. He strongly opposed the teaching of Aristotle's works, fearing that it would indeed lead to the idea of an autonomous nature that exists independently of God and is ruled by necessary relations that would impede the action of divine will. According to Spencer, this opposition reached a climax in 1277, when the bishop of Paris condemned 219 propositions, many of which seemed to restrict God's power and freedom.[26] Nevertheless, the works of Aristotle and his Ar-

25 John L. Heilbron, *The Sun in the Church: Cathedrals as Solar Observatories* (Cambridge, MA: Harvard University Press, 1999), 3.

26 Spencer, *Magisteria*, 79.

abic commentators remained "part of the university curriculum in the fourteenth century and beyond."[27] At the same time, following the pioneering work of French theoretical physicist and historian Pierre Duhem, Spencer notes that the Condemnation of 1277 actually liberated medieval science from Aristotle's fixed categories of explanation, opening the way to more observational or experimental sciences.

This more observational approach to nature is often associated with the seventeenth-century scientific revolution. But in a few short lines, Spencer questions that whole narrative. He notes, for instance, that Nicolaus Copernicus (1473–1543) neither formulated a scientific method nor used experiment in his promotion of a heliocentric model of the solar system.[28] In fact, according to Spencer, Copernicus continued to see the study of nature through medieval lenses, seeing natural philosophy as an aid to the virtuous life. Moreover, Copernicus did not single-handedly call into question the Ptolemaic geocentric system. Indeed, Islamic astronomers had rejected Ptolemy since the eleventh century, and Copernicus showed his debt to these studies by citing at least five Islamic scholars in his *On the Revolutions of the Celestial Spheres*. However, despite evidence to the contrary, from such scholars as Kenneth Howell[29] and the late Owen Gingerich,[30] Spencer seems to think that by publishing his work, Copernicus risked humiliation, if not his life.[31] I could not make out if Spencer is being merely facetious in claiming this or if he actually believes this was the case. If the latter, then Spencer's commentary reveals that he, too, has fallen prey to some version of the "conflict" narrative.

In any event, Spencer is on more solid ground in discussing the hermeneutical contributions of Copernicus, Kepler, and Galileo. He correctly notes that these natural philosophers all proffered an "ac-

27 Spencer, *Magisteria*, 81.
28 Spencer, *Magisteria*, 85.
29 Kenneth J. Howell, *God's Two Books: Copernican Cosmology and Biblical Interpretation in Early Modern Science* (University of Notre Dame Press, 2002).
30 Owen Gingerich, *The Eye of Heaven: Ptolemy, Copernicus, Kepler* (New York: The American Institute of Physics, 1993) and *The Book Nobody Read: Chasing the Revolutions of Nicolaus Copernicus* (New York: Walker & Co., 2004).
31 Spencer, *Magisteria*, 89.

commodationist" interpretation of the Bible. On a chapter devoted entirely to Galileo (1564–1642), often considered a paradigmatic example of the "conflict thesis," Spencer not only debunks the notion that Galileo was a "prisoner of the Inquisition," but that he offered a radically new way of reading Scripture (115).[32]

Now, the seventeenth century comes at the end of what scholars have divided as three successive events—the Renaissance, the Reformation, and the Scientific Revolution. These divisions have been appropriately challenged by many historians, including Spencer, but they may still serve as useful signposts. As it relates to the relationship between science and Christianity, Renaissance thinkers pursued an even deeper and more comprehensive engagement with classical learning than what we witness in the twelfth through the fourteenth centuries. During the Renaissance we see the revival of a number of different strands of ancient thought about nature, including some of the more esoteric elements such as magic, astrology, alchemy, and the Neoplatonic writings.[33]

Renaissance thought does not play a large role in Spencer's narrative, which is unfortunate. It also might explain some of the shortcomings to his story, which I will explain in more detail in a moment. For now, it is enough to note that the Renaissance revival of ancient thought often came into conflict with historical Christian belief. In this period, for example, we see the revival of ancient Greek atomism. The rediscovery of Democritus (ca. 460–370 BC), Epicurus (ca. 341–270 BC), and especially Lucretius (ca. 99–55 BC) gave rise to a crisis of atheism among some Christian theologians. Greek atomism provided reasons and arguments for materialism and a naturalised world. Strictly speaking, these ancient writers did not deny the existence of the gods. Rather, they simply maintained that the gods care nothing for us and do

32 Spencer, *Magisteria*, 115.

33 See the classic study by Frances A. Yates, "The Hermetic Tradition in Renaissance Science," in *Art, Science, and History in the Renaissance*, ed. Charles S. Singleton (Baltimore: Johns Hopkins Press, 1968), 255–274.

nothing for us, and therefore we ought to be content with the simple pleasures of nature.[34]

This sort of revived "mechanical" philosophy, as it came to be called, insisted that there is nothing eternal but matter and void, that the universe is not divinely created but the product of the impact and concurrence of atoms, guided by nothing else but chance and necessity.[35] Early modern Christians attempted to accommodate the revival of Epicurean naturalism with Christian faith. From this attempt came the idea that the regularities observed in the natural world were thought of as "laws" imposed by God.[36] Laws of nature, in short, were understood to amount to divine commands bestowed by a Lawgiver. Nevertheless, such attempts at reconciliation only served to heighten tensions. The problem of atheism will loom large in later treatises on natural philosophy and theology, particularly among the so-called "English virtuosi" of the seventeenth and eighteenth centuries—which Spencer does cover in later chapters, but not with the kind of nuance necessary to understand what was really happening.[37]

Another important feature of Renaissance thought, and not entirely removed from the revival of Epicureanism, was its more positive outlook on humanity itself—what came to be called "humanism." To be

34 See the classic study by Paul Oskar Kristeller, *Renaissance Thought: The Classic, Scholastic, and Humanistic Strains* (New York: Harper, 1955). For an accessible and entertaining account of the recovery of these ancient Greek writers, see also Stephen Greenblatt, *The Swerve: How the World Become Modern* (New York: W. W. Norton & Co., 2012).

35 See the still useful surveys in E. J. Dijksterhuis, *The Mechanization of the World Picture*, trans. C. Dikshoorn (New York: Oxford University Press, 1961) and Richard S. Westfall, *The Construction of Modern Science: Mechanisms and Mechanics* (Cambridge University Press, 1977), esp. 25–42.

36 See Edgard Zilsel, "The Genesis of the Concept of Physical Law," *The Philosophical Review* 51:3 (1942): 245–279; Francis Oakley, "Christian Theology and the Newtonian Science: The Rise of the Concept of the Laws of Nature," *Church History* 30:4 (1961): 433–457; Alan G. Padgett, "The Roots of the Western Concept of the 'Laws of Nature': From the Greeks to Newton," *Perspectives on Science and Christian Faith* 55:4 (2003): 212–221.

37 A short summary of these developments can be found in William B. Ashworth Jr., "Christianity and the Mechanistic Universe," in *When Science & Christianity Meet*, ed. David C. Lindberg and Ronald L. Numbers (University of Chicago Press, 2003), 61–84.

sure, modern "secular humanism," as encountered in polemics in the press and in daily life by adherence to a secular ethical code centred on human nature and possibilities, places the human being front and centre, free of religious frameworks. Renaissance humanism, however, was a different phenomenon. It was grounded in the study of the Greek and Latin classics, which were ultimately blended with Christian theology.

A characteristic feature of all this was the appreciation of human capacity and creativity. What does it mean to be human? What is the value of human life? These and similar questions were of the greatest importance during the Renaissance, and, as we pointed out earlier, central to Spencer's narrative. Petrarch (1304–1374), Giovanni Pico della Mirandola (1463–1494), and Michel de Montaigne (1533–1592), for instance, marvelled at the human achievements of their time. Pico, in particular, gushed about humanity in his *On the Dignity of Man* (1486). In it, he argued that human beings can ascend to the heights of human knowledge through philosophy. Moreover, according to Pico, God had given no specific place and no specific function to humanity, and so it was free to claim whatever seat, whatever form, whatever abilities it preferred. God predetermined the nature of all other creatures, but God made Adam "neither mortal, nor immortal," so that "as the maker or moulder" of his own destiny he may determine his own nature.[38]

These are extraordinary words. They look ahead to the existentialism of modern times as much as to ancient cosmology. They identify the human condition as contingent, multivalent, and indeterminate. It is Adam who will "fashion" himself and be his own "maker" and "moulder." God is the creator of the universe, and the creator of humankind; but he endows humanity with the capacity to create itself! Humanity is thus the "chameleon" of God's cosmos.

Both Humanists and Mystics

While Spencer does not explicitly emphasise the point, the pursuit of "humanism" and natural philosophy often intersected with each oth-

38 Pico della Mirandola, *On the Dignity of Man* (Indianapolis: Hackett, 1965), 5.

er at key moments, as they developed from the fifteenth to the seventeenth centuries. Indeed, Copernicus, Galileo, and Kepler were all children of the Renaissance, born and raised in a world created by the European humanists. Copernicus, while he was no humanist himself, was deeply indebted to humanism. He encountered humanism in the Italian universities where he spent the years of his youth. He studied Greek and he scoured the books of ancient Greek astronomers to find the key to the problem he posed for himself.

Johannes Kepler (1571–1630) followed Copernicus in demonstrating mathematically the motion of the planets. And, like Copernicus, he was driven by certain religious commitments. He saw nature as revelatory. In his first major astronomical work, *The Cosmographic Mystery, or The Secret of the World* (1596), which was basically a defence of the Copernican system, Kepler maintained that the universe reflects God's handiwork. In describing the mathematical elegance of the laws of planetary motion, Kepler confessed that he had been carried away by an "unutterable rapture at the divine spectacle of heavenly harmony." He later reported to a friend, "I wanted to be a theologian … and for a long time I was restless. But now see how by my pains God is being celebrated in astronomy also."[39]

Perhaps most important for later thinkers, Kepler saw himself and other natural philosophers as "priests" of the book of nature. Since "we astronomers are priests of the highest God in regard to the book of nature," he wrote, "we are bound to think of the praise of God and not of the glory of our own capacities." But while Kepler may have considered himself a Christian, he was also an ardent Platonist and Pythagorean, who saw himself a "priest" of God in the temple of nature.[40] Obviously, a Platonic or Pythagorean god is not identical to the God of Abraham, Isaac, and Jacob. While Kepler believed that no conflict could exist between the book of God's word and the book of nature, and

39 For a selection of Kepler's correspondence, see *Johannes Kepler: Life and Letters*, ed. Carola Baumgardt (New York: Philosophical Library, 1951). See also the study by Max Casper, *Kepler* (New York: Dover, 1993).

40 See Rhonda Martens, *Kepler's Philosophy and the New Astronomy* (Princeton University Press, 2000).

considered himself a lifelong Lutheran, he never did fully subscribe to his church's official confession.

More importantly, Kepler prescribed an accommodationist epistemology of biblical interpretation that went beyond the patristic tradition. In his words,

> Now the holy Scriptures, too, when treating common things (concerning which it is not their purpose to instruct humanity), speak with humans in the human manner, in order to be understood by them. They make use of what is generally acknowledged, in order to weave in other things more lofty and divine.[41]

Thus, in an important sense, Kepler is practising exegesis. This "accommodation theory," which maintains that Scripture speaks to men and women in human fashion, would become a foundational argument of progressive biblical criticism in the seventeenth century. For Kepler, Scripture is not a textbook of astronomy—but astronomy can be a textbook of God, from which we can learn his wisdom and greatness.

Thus what we see in Kepler, Galileo, Copernicus, and other scientific luminaries during the early modern period is the proposal of a "double truth" doctrine that began to develop in the medieval period. Theology has no authority in the realm of natural philosophy. At the end of the seventeenth century, we begin to see the emancipation of science (and the "scientist"), which, regardless of the doctors of the church, is bound only by truth which can be empirically demonstrated and proved. Kepler and his colleagues were asserting the independence of scientific research from all philosophical and theological principles.

The Reformation

These murky details are absent from Spencer's narrative. Indeed, his account of the entangled relationship between science and theology in

41 In William H. Donahue, *Selections from Kepler's* Astronomia Nova (Santa Fe, NM: Green Lion Press, 2008), 19.

the early modern period is rather conventional. Having mostly ignored Renaissance thought and given only a conventional myth-busting of the Galileo affair, Spencer backtracks a bit to reassess the common belief among many historians, that the Protestant Reformation played a significant role in ushering in the rise of modern science. The general consensus among historians of science and religion is that there was something about the Protestant religion that encouraged the practice of science. "Protestant reformers," Spencer observes, "placed a new emphasis on the ability of all believers to honour their creator through their daily activities," including the practice of science.[42] Following once again the work of Harrison, Spencer argues that the emphasis on a more literal approach to Scripture was also applied to the study of nature, eliminating the emblematic or symbolic model of medieval Catholic exegetes.[43] "As with the book of scripture," writes Spencer, "so with the book of nature."[44] The hermeneutical preconditions of modern science, in short, are found in the Protestant, literal understanding of Scripture. When Protestants stripped the Book of Scripture from its symbolic meaning, all texts, including the Book of Nature, became open to new interpretation. Whereas many might view biblical literalism as an obstacle to science, in the seventeenth century it brought with it an alternative conception of the natural order.

Moreover, when Protestants reappropriated Augustinian anthropology, it led to a greater emphasis on experimentation. Indeed, Augustine's idea of original sin was quite popular among those who believed in experimental natural philosophy. They believed that humans were greatly affected by Adam's fall, and it made them unable to understand the world through pure thinking. Instead, they had to rely on experimentation and observation to gain knowledge about how nature works.[45] Even then, they knew that their knowledge could never

42 Spencer, *Magisteria*, 134.
43 Peter Harrison, *The Bible, Protestantism, and the Rise of Natural Science* (Cambridge University Press, 1998).
44 Spencer, *Magisteria*, 135.
45 Once more, Spencer is following the erudite work of Peter Harrison, esp. *The Fall of Man and the Foundations of Science* (Cambridge University Press, 2007).

be certain. This is how Christian doctrine was able to give a sense of urgency to experimentation.[46] But Spencer also seeks balance here. He reminds us that "Catholic lands boasted some of Europe's most impressive scientific minds in the early seventeenth century," such as Pierre Gassendi, Blaise Pascal, and René Descartes, for instance.[47]

From Natural Theology to Scientific Naturalism

From these early modern natural philosophers, Spencer transitions to the new natural theology that developed during the seventeenth and eighteenth centuries. The Parisian Enlightenment and the French Revolution do not play a significant role in Spencer's narrative, however. But that is to his credit. Thinkers like Diderot, Helvétius, Holbach, and lesser figures were undoubtedly "rationalists," hostile to religion. But they also remained elitists who promoted a liberal paternalism rather than a democratic process.[48] Moreover, the French savants exalted a bloodless notion of "reason" to bloody effect, as evidenced in the subsequent "Reign of Terror." The jibe of Edward Gibbon against the French is well known. The French, Gibbon wrote, "preached the tenets of atheism with the bigotry of dogmatists." The British Enlightenment, on the other hand, as historian Gertrude Himmelfarb noted, was "reformist rather than subversive, respectful of the past and present while looking forward to a more egalitarian future."[49] Furthermore, it should be remembered that, shortly after revolutionary Maximilien Robespi-

46 Spencer, *Magisteria*, 137.
47 Spencer, *Magisteria*, 138–141.
48 Criticisms of the established religion had already appeared among more moderate English and German thinkers nearly a century earlier. What was unique about the French response was their emotional and often violent protests against institutions of all kinds, not just religious. Indeed, scholarly literature shows that the social and political upheavals caused by the French Revolution forced many scientific institutions to close. It was Napoleon who modified many scientific institutions, centralising their authority under government control.
49 Gertrude Himmelfarb, *The Roads to Modernity: The British, French, and American Enlightenments* (New York: Vintage, 2004), 51.

erre was executed, Napoleon Bonaparte reconciled himself and the nation to the Catholic Church.

At any rate, there appeared among English thinkers of the period a "holy alliance" between science and religion. Spencer notes that many of these so-called physico-theologians strayed from orthodoxy.[50] Moreover, in his discussion of the rise of natural theological traditions among English thinkers, Spencer fittingly returns to Pascal, who offered a powerful critique of basing our knowledge of God on natural revelation rather than special revelation in the biblical text. "Proofs can only carry us to speculative knowledge of God," Pascal wisely wrote, but "to know him in this manner is not to know him at all."[51]

The rise of physico-theology in the period was directly connected to the resurgence of the "mechanical" philosophy of Democritus. And although many religious thinkers attempted to "baptise" Epicureanism, it nevertheless led to an increasingly materialistic worldview.[52] We see this in the work of physicians David Hartley (1705–1757) and Julien Offray de La Mettrie (1709–1751), naturalist Georges-Louis Leclerc, Comte de Buffon (1707–1788), and Pierre-Simon Laplace (1749–1827). Accordingly, what we find at the end of the eighteenth century and the beginning of the nineteenth is a mass "exodus" from the older, patristic understanding of the relationship between natural knowledge and faith. This "naturalistic" process included, unsurprisingly, the Bible.[53] Geologists in the early nineteenth century, for instance, whether they were "catastrophists," "uniformitarians," "vulcanists," or "neptunists," all began to naturalise the Genesis creation stories. As Spencer puts it, "biblical Protestantism was being eroded from *within* as well as assailed from *without*."[54]

50 Spencer, *Magisteria*, 160.
51 Spencer, *Magisteria*, 179.
52 See the late Ron Numbers, "Science without God: Natural Laws and Christian Beliefs," in *When Science & Christianity Meet*, ed. David C. Lindberg and Ronald L. Numbers (University of Chicago Press, 2003), 265–285.
53 Spencer, *Magisteria*, 211.
54 Spencer, *Magisteria*, 213 (my emphasis).

It would not take much from naturalising the world to naturalising the human soul. The "science" of phrenology, for example, led by such figures as Franz Joseph Gall (1758–1828), J. G. Spurzheim (1776–1832), and George Combe (1788–1858), naturalised the human mind, arguing that as the "physical laws regulated the entire universe," there were "organic laws" that governed the life, moral, and intellectual element of human nature.[55] What Spencer misses in this discussion, as most other historians of science did, is that Combe published a remarkable treatise in 1847 entitled *On the Relation Between Religion and Science*. Ironically, Combe credited the work of natural theologians for convincing him that God reigned through fixed, immutable natural laws. Interestingly, he also argued that the Reformation remains to be completed, equated progress in religion with progress in knowledge, and even accused "religious professors" of atheism when they denied the laws of nature. What needs to occur, according to Combe, is a second or "new Reformation."[56] While men like Combe rejected orthodox Christianity, he nevertheless drew from a nineteenth-century natural-theological tradition that claimed moral and spiritual value for the study of the laws of nature.

Darwin's Legacy

Spencer then spends two chapters adding layers of complexity to the work of Charles Darwin (1809–1882) and the various responses to his *Origin of Species*, which was first published in 1859. Darwin, who had grown up reading the natural theologians, had come to similar conclusions as Combe, that any kind of "special creation" made God look weak and incompetent. Ironically, but perhaps not surprisingly, the popularisation of the sciences by the natural theologians led to the rejection of the very project of natural theology. The *Origin of Species* did not mention the word "evolution," but Darwin used "creation" and its

55 Spencer, *Magisteria*, 221.

56 On this theme, see James C. Ungureanu, "Science, Religion, and the 'New Reformation' of the Nineteenth Century," *Science & Christian Belief* 31:1 (2019): 41–61.

cognates over one hundred times. Opposite the title was a quotation about studying God's works as well as his word. Darwin ended his book in a rhapsody about the "grandeur" of viewing nature's "most beautiful and most wonderful" diversity as the product of "powers … originally breathed into a few forms or into one." This reference played to traditionalists, but the tone and the terminology—even the biblical "breathed"—were not insincere. From beginning to end, the *Origin of Species* was a pious work: "one long argument" against miraculous creation but equally a theist's case for creation by law.

But Darwin's "theism" was thin, and by the end of his life it eventually snapped. However, it should be clear that it was not so much science or his evolutionary theory that led Darwin to abandon his faith, but rather his liberal Protestant upbringing, which was tenuous at best. These liberal Protestant sensibilities provided Darwin with moral objections to traditional theology. When his ten-year-old daughter, Annie, died tragically in 1851, he found no comfort in the creed of his upbringing. His father's death had also caused consternation. Eternal punishment, he believed, was a "damnable doctrine."[57] Moreover, looking at nature "red in tooth and claw," as Alfred Tennyson put it, deeply troubled Darwin. He believed that it was "derogatory that the Creator of countless systems of worlds should have created each of the myriads of creeping parasites and worms which have swarmed each day of life on land and water on [this] one globe."[58] While the natural theologians had pointed out the beauty and ordered complexities of nature, Darwin could only see cruelty, death, and chaos.

At first Darwin avoided any discussion of "human evolution." But later, in his *Descent of Man*, published in 1871, he contended that humans had evolved physically by natural selection and then intellectually and morally through the inherited effects of habit, education, and religion. According to Darwin, "with the more civilised races, the conviction of the existence of an all-seeing Deity has had a potent in-

57 See Charles Darwin, *The Autobiography of Charles Darwin*, ed. Nora Barlow (New York: W. W. Norton & Co., 1958), 87.

58 Spencer, *Magisteria*, 247.

fluence on the advance of morality," so much so that "the birth both of the species and of the individual are equally parts of that grand sequence of events, which our minds refuse to accept as the result of blind chance."[59]

At the end of the nineteenth century, the discipline of anthropology was also emerging from writers such as E. B. Tylor (1832–1917), James G. Frazer (1854–1941), and Émile Durkheim (1858–1917), all of whom were influenced by evolutionary theory. Despite the intention of objectivity, a strong thread of philosophical naturalism permeated the field. One response to Darwin's ideas, according to Spencer, was the rise of a scientific racism that utilised ethnological studies to support theories of the "white superiority."[60] This has a long and complicated history. The eighteenth and nineteenth centuries witnessed a prolonged and acrimonious feud between what came to be called "monogenists" and "polygenists." During the medieval period, European scientific conceptions of human origins assumed the literal truth of the biblical narrative that the varieties of the human race were descended proximately from three sons of Noah and, ultimately, from Adam and Eve. Cartographic representations routinely associated the three known continents—Asia, Africa, and Europe—with the three sons of Noah—Sem (Shem), Cham (Ham), and Japheth—thereby integrating a threefold continental schema with a tripartite racial taxonomy.

As time went on, however, challenges to the standard biblical account began to emerge from various sources. One such source was the increasing availability of what were referred to as pagan chronicles. These texts posed a significant threat to the received wisdom, as did expeditions to "the East." It was a major moral problem for chronologists studying world history, as the annals of pagan history seemed to confirm the speculations of infidels who claimed the existence of genealogies predating the biblical Adam.

59 Charles Darwin, *Evolutionary Writings, Including the Autobiographies*, ed. James A. Secord (Oxford University Press, 2008), 325.

60 Spencer, *Magisteria*, 279.

One means of coping with challenges was the beguilingly simple theory that the biblical Adam was simply not the first human being. The idea of preadamic humans had been long hinted at, for example, in the writings of Moses Maimonides (1135–1204). But it was in the monumentally "heretical" doctrine of Isaac de la Peyrère (1596–1676), promulgated in his *Prae-Adamitae* (1655), that the preadamite theory found its first sustained champion. The basic thrust of the treatise was that only the Jews were descended from the biblical Adam and that the other world peoples were derived from non-Adamic progenitors. At once, this fundamentally polygenetic account of human origins relieved the biblical text of the burden of pagan history and provided a compelling account of the genesis of New World peoples.[61]

During the nineteenth century, efforts were made to maintain cordial relations between burgeoning ethnological studies and theology. To be sure, many rejected its polygenetic ethos and retained a monogenist environment. But, with the prevailing polygenetic flavour of contemporary anthropology, the preadamites were frequently conscripted into the service of Christian apologetic. That the polygenist thesis was finding favour with Christian apologists and scientific racists alike certainly does not mean that monogenist adherents to the traditional Adamic narrative had disappeared. Throughout the middle decades of the nineteenth century, the conventional monogenist history continued to be defended.

Although some Christian thinkers were guilty of racist views, it was mostly in scientific circles where eugenics first emerged, with its attempt to tie social constructions of inferiority to physical attributes.[62] Swedish botanist Carolus Linnaeus (1707–1708) created "scientific" racial classifications and descriptive characteristics. In the nineteenth century, Louis Agassiz (1807–1873), a Swiss-born Harvard professor, argued that human beings do not share a common ancestry (monogenism); instead, he argued that God created the races as separate and

61 See David N. Livingstone, *Adam's Ancestors: Race, Religion & the Politics of Human Origins* (Baltimore: Johns Hopkins University Press, 2011).

62 See Nathan G. Alexander, *Race in a Godless World: Atheism, Race, and Civilization, 1850–1914* (New York University Press, 2019).

distinct human categories (polygenism). But, as science increasingly became "secularised," the ideological effects of replacing Christian doctrine with scientific naturalism opened the way for racism to take hold of modern society. Whereas the Bible proclaimed that God "hath made of one blood all nations of men" (Acts 17:26), secular science in eighteenth- and nineteenth-century Europe and North America began to claim that different human groups had emerged or evolved separately, creating a "natural" racial hierarchy with whites on top.

Indeed, many white freethinkers and atheists held racist assumptions which they based on scientific knowledge. In his narrative, Spencer points to the gut-wrenching story of Ota Benga. In 1906, William Temple Hornaday, director of the New York Zoological Park, "acquired" the Congolese pygmy Benga and put him on public display in the "monkey house." The exhibit drew huge crowds. Hornaday speculated that Benga might be that "missing link" between humans and primates. The exhibit was protested. The Colored Baptist Minister Conference, led by Rev. James H. Gordon, denounced the display, declaring "our race … is depressed enough, without exhibiting one of us with the apes." A white pastor, Rev. R. S. MacArthur, of Calvary Baptist Church, agreed. "The person responsible … degrades himself as much as he does the African." Hornaday and others defended the exhibit by proclaiming themselves firm "believers in the Darwinian theory." This "purely … ethnological exhibit" would help, one defender wrote, "our clergymen to familiarize themselves with the scientific point of view so absolutely foreign to many of them." Thus a clear confirmation, for many at the time, of the "conflict" between "science and religion."[63]

Perhaps out of necessity, Spencer's comprehensive and coherent narrative ends midway through his book. With the remaining pages, he offers very episodic and somewhat disjointed accounts of the Scopes "monkey trial,"[64] the "new physics,"[65] the rise of the "scientific" study

63 Spencer, *Magisteria*, 278–287.
64 Spencer, *Magisteria*, 317–333.
65 Spencer, *Magisteria*, 335–351.

of religion,[66] the "space race" between the United States and Russia,[67] and the emergence of modern "intelligent design" theory,[68] before concluding with some brief comments on anxieties over artificial intelligence.[69] These are important chapters, and they offer much insight into the "ongoing, entangled histories of science and religion." For instance, it is important to note that the textbook in question during the John T. Scopes trial, G. W. Hunter's *A Civic Biology*, was never simply about mere biology. Indeed, in the pages of this high-school textbook, Hunter advocated eugenics and social Darwinism that called for the elimination of the "lower animals" of people.[70] This scientific racist agenda was inimical to the reformist and progressive democratic politician William Jennings Bryan (1860–1925). Indeed, during the Scopes trial, Bryan was concerned about the impact the theory would have on morality and the democratic process.[71] Indeed, Darwinism was often used to justify monstrous ends in the first half of the twentieth century, such as the sterilisation of "criminals, drunks, promiscuous women, 'morons' and 'imbeciles' … as well as a number of poor, unemployed, disabled and black citizens," writes Spencer.[72]

While these final chapters lack the kind of coherent narrative of the first half of his book, Spencer nevertheless succeeds at showing how deeply complex and entangled the history of science and religion continues to be.

Another Look at the Conflict Thesis

Before drawing this essay to a close, something needs to be said about the origins of the "conflict thesis" itself. Spencer offers hints at these

66 Spencer, *Magisteria*, 353–367.
67 Spencer, *Magisteria*, 369–383.
68 Spencer, *Magisteria*, 385–399.
69 Spencer, *Magisteria*, 401–418.
70 Spencer, *Magisteria*, 320.
71 Spencer, *Magisteria*, 322.
72 Spencer, *Magisteria*, 322.

origins,[73] but much more needs to be said.[74] Most historians have been tracing the origins of the conflict thesis to the nineteenth century, specifically the Anglo-American writers. Many point to the scientific naturalists, a Victorian clique made up of biologist Thomas H. Huxley (1828–1895), physicist John Tyndall (1820–1893), and evolutionary philosopher Herbert Spencer (1820–1903), among others, who supposedly employed the "conflict thesis" in their attempt to professionalise and secularise the sciences.

More specifically, however, the most important whipping boys for historians of science have been New York University chemist John William Draper (1811–1882) and historian and first president of Cornell University Andrew Dickson White (1832–1918). The vast majority of scholars now claim Draper and White as "cofounders" of a philosophy of history that has endorsed the belief that science and religion have been and always will be at odds. Draper and White are big figures in historical studies of science and religion, and thus it is no surprise that Spencer also frames his narrative around the work of these two historical figures.[75] To his credit, Spencer adds some much-needed complexity to how we should understand the motivations of Draper and White. However, his framing is still somewhat misleading. Simply put, they are not guilty of the charges brought against them by most historians of science. That is, they are not the architects or cofounders of the "conflict thesis," at least in the conventional sense. For example, many historians, including Spencer, think Draper in particular had something against the Roman Catholic Church. And no doubt he did. But so did everyone else at the time. Anti-Catholic sentiment was at its height in the late nineteenth century, especially in America. In terms of White, historians argue that religious criticism of his beloved non-sectarian Cornell University set him off. But White had already formulated his

73 Spencer, *Magisteria*, 301–313.

74 What follows is a summary of my own treatment of the subject in *Science, Religion, and the Protestant Tradition: Retracing the Origins of Conflict* (University of Pittsburgh Press, 2019).

75 Spencer, *Magisteria*, 3.

views prior to founding Cornell University. He was in fact teaching the same to undergraduate students at the University of Michigan.

The conventional view fails because—simply put—it ignores what Draper and White actually said they were doing. So, what did Draper and White believe? Draper actually advocated a return to a purer, more rational Christianity. In his early lectures on chemistry, for example, he sounds rather like a natural theologian. He spoke of the laws of nature as designed and set in place by the Almighty God, the Creator, the Great Architect. This more "rational" or "reasonable" Christianity harkens back to figures like Francis Bacon and the early members of the Royal Society of London, which was founded in 1660. Later, the English deists adopted the same position, in addition to philosophers like John Locke. Interestingly enough, all of them looked back to the Protestant Reformation as the reformation of both religion and science, or natural philosophy.

Moreover, looking at the entire corpus of Draper's writing is important. His *History of the Conflict* was largely a condensed version of previously published works. Most importantly, he had published a *History of the Intellectual Development of Europe* (1863), where he made a crucial distinction that most historians of science have forgotten or ignored. In discussing the so-called "paganisation" of Christianity under Emperor Constantine, Draper distinguished between Christianity and "ecclesiastical organisations." "The former," he wrote, "is a gift of God; the latter are the product of human exigencies and human invention, and therefore open to criticism, or, if need be, to condemnation." He argued that the paganisation of Christianity had resulted in the "tyranny of theology over thought," and declared that those "who had known what religion was in the apostolic days might look with boundless surprise on what was now ingrafted upon it, and was passing under its name."

Even his notorious *History of the Conflict*, under closer inspection, continues to make such distinctions. He argued that he would only consider the "orthodox" or "extremist" views, not the moderates. He even expressed concern that "traditionary faith" was leading the "intelligent classes" to give up on religion entirely. His narrative, in

short, was intended to show that the decline of religious faith was a direct consequence of a "materialised" or politicised Christianity, not science. And, perhaps most importantly, Draper concluded that while science and Catholicism are almost impossible to reconcile, Protestantism and science can maintain a continued friendship if all the misunderstandings can be eliminated.

So, two crucial points are in order here. First, Draper's understanding of history, particularly theological history, is mostly taken from Protestant thinkers. Secondly, his own religious beliefs seem to have been mostly inspired by Unitarian minister and chemist Joseph Priestley. In one of his lectures, Draper told his students that "we must not impute it to mental weakness" that Priestley passed through so many religious beliefs before arriving at Unitarianism, "but rather to the pursuit of truth." Clearly, then, Draper was no atheist. He looked back to the "rational religion" found among seventeenth- and eighteenth-century intellectuals, who viewed the new knowledge of nature as evidence of the creative power of God. This group of Christian thinkers sought not only to demonstrate how God has revealed himself in nature, but how a "rational" Protestantism provided an atmosphere more conducive to the sciences. Protestantism, in other words, embodied the principles that would allow for the progress of learning, society, and religion itself. In this sense, Draper can firmly be placed in the Protestant tradition.

But, upon deeper reflection, many of these Protestant thinkers held rather unorthodox views. Indeed, many, if not most, were anti-Trinitarians, and some even denied the divinity of Christ. Deeply impressed by the new learning, they sought to minimise doctrinal discord by emphasising human reason in understanding revelation. They frequently preached for a more "reasonable Christianity" at the pulpit. They were united in the belief that the most serious threat to religion was the irrational, and thus hoped to continue the reformation of religion along more rationalistic lines.

White shared many of the same sentiments in his own historical narrative. History showed, according to him, that "interference

with Science in the supposed interest of religion … has resulted in the direst evils both to Religion and Science, and invariably." Nevertheless, by separating religion from theology, White could denounce that the "most mistaken of all mistaken ideas" was the "conviction that religion and science are enemies." While science has conquered "dogmatic theology," he argued, it will "go hand in hand with Religion." The whole point of his narrative, he later wrote in his *Autobiography*, was to "strengthen religious teachers by enabling them to see some of the evils in the past which, for the sake of religion itself, they ought to guard against in the future."

White was in the same Protestant stream as Draper, but in a different segment. However, White did not look to the past but rather to contemporary conceptualisations or reinterpretations of "religion." Religion is found, White believed, in moral conscience, intuition, and sentiment. This definition of religion was, of course, not new. Indeed, it exemplified essential elements of the Romantic movement, which had become by the late nineteenth century a central component of liberal Protestant thought. As a young man, White had studied in Germany, mostly at the University of Berlin, with Carl Ritter and Leopold von Ranke. There he had come across Gotthold E. Lessing, Johann Wolfgang von Goethe, Friedrich Schiller, Friedrich Schleiermacher and other "mediating" German thinkers. Lessing, for example, talked about the evolution of religion. He maintained that all faiths lead to one universal truth. No creed or dogma was complete or final. Christianity was ever-evolving just like the rest of civilisation. White had imbibed this idea. It became part of his worldview. Schleiermacher convinced him, moreover, that true religion is not found in doctrine or books or dogma, but in intuition, feeling, and the inward witness of the heart. German mediating thinking was, in short, an attempt to reconcile Christianity with modernity.

In short, both Draper and White tried to find ways to reconcile Christian faith and science (or modernity), not to promote conflict or warfare. Interestingly enough, many of readers of their early thoughts (private correspondence, periodical press, newspapers, magazines, ac-

ademic journals) also believed that Draper and White were seeking a reconciliation between science and religion. In particular, a number of religious liberal magazines—on both sides of the Atlantic—viewed Draper and White's work as an entirely "Protestant" project. Their proposals were not particularly new. What they did was consolidate a number of narratives that were already in circulation—that were commonplace—particularly amongst Protestant theologians, historians, and men and women of science. The conflict they spoke of was an internal one, one between contending Christian groups. For them, the "conflict" or "warfare" was not between "science and religion" but between contending Protestant traditions—in one corner the "new theology" of liberal Protestantism, which deemphasised Scripture, dogmatism, institutionalism, and, in the other corner, "traditionary faith," creeds and doctrines, orthodoxy, and in general a more conservative Protestantism.

Spencer misses most of this complexity in discussing Draper and White. At the same time, he has not set out to trace the origins of the conflict thesis, but rather to tell the tale of the "entangled" histories of science and religion. One could also protest that despite the "conflict" being a myth, as Spencer contends, most scientists continue their science today without recourse to any "God-talk" in their research. Something has obviously changed. As the late Ron Numbers put it, "nothing has come to characterize modern science more than its rejection of appeals to God in explaining the workings of nature."[76] Spencer never adequately addresses this "secularisation" of the sciences. To address this is impossible, I would suggest—as I have done in my own treatment of the subject—without examining the vicissitudes of theology in the early modern period. The emerging conflict—as William Placher, Charles Taylor, Brad Gregory, and many others have pointed out—was between contending theological traditions, with the unintended consequence of unbelief.

Nevertheless, *Magisteria* remains a helpful corrective of many "myths" about science and religion. Spencer keeps his personal views

76 Numbers, "Science without God," 265.

to himself, but he definitely has a particular perspective on certain issues. He allows scientists the authority to speak on the physical aspects of reality but calls into question their claims over ethical or spiritual dimensions. Like Pascal, Spencer stresses the importance of recognising the vulnerability, dependency, and mortal nature of human beings. Humanity is like a "reed," easily blown over. But he is a "thinking reed," concerned with meaning, purpose, and transcendence. As such, in interviews and public talks, Spencer often refers to himself as a "Christian humanist." *Magisteria*, while not entirely forthcoming, nevertheless serves as a good starting point of how a Christian humanist should approach the entangled histories of science and religion.

The author reports there are no competing interests to declare.
Received: 08/08/23 Accepted: 20/09/23 Published: 25/10/23

Reflections on the Relationship between Orthodox Christian Theology and Psychoanalysis: A Review Essay

Antonios Kaldas

Abstract: At a time when mental health is generally deteriorating, editors Eudoxia Delli and Vasileios Thermos have opportunely produced a volume that closely examines the intersection of Orthodox Christian theology and contemporary psychoanalysis. This volume provides access for English-speaking readers to a vibrant conversation on this topic, as it currently occurs in the Greek context. This review essay considers the insights this volume provides, and the application of these insights to the life of the church. The volume is a valuable contribution that argues persuasively from a variety of perspectives that the church and psychoanalysis can and ought to enjoy a fruitful and beneficial partnership. The art of looking within is as important today as ever, but more so in our age of widespread mental health issues.

Keywords: mystical theology; Orthodox Christian theology; pastoral care; psychoanalysis

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Fr Antonios Kaldas lectures in Philosophy at St Cyril's Coptic Orthodox Theological College within the Sydney College of Divinity. He has served as parish priest since 1991, was previously a medical practitioner, and is currently an active researcher in philosophy of mind and cognitive science. The author would like to thank Fr Vasileios Thermos for generously giving of his time to discuss this volume with him and to point him in the direction of some valuable resources on its subject matter, Fr Doru Costache for helpful editorial suggestions, and Janiene Wilson and the two anonymous reviewers for their comments.

Human nature is conscious and subconscious, personal and communal, immaterial and embodied, synchronic and diachronic.[1] This makes people immensely complex beings with immensely complex lives—both inner and outer—so much so that it may not be an exaggeration to say that our default state is one of befuddlement: Who am I really? Why did I do that? Where did that thought come from? Why do I feel this way? We struggle as we seek to live well and be authentic.

Soul and Psyche as a Surprise: Psychoanalysis and Orthodox Theology in Dialogue (henceforth, *Soul and Psyche* for short)[2] is an edited volume about two ways by which humanity has been grappling with this ubiquitous befuddlement: religious faith (Orthodox Christian faith, in this case) and modern psychoanalysis. Since a number of its authors mention the debt of psychoanalysis to Judeo-Christian foundations, I begin this article with a brief—and incomplete—account of the background to this volume, followed by an overview of the volume's content. The bulk of the article describes and discusses key themes that run through the chapters. I conclude with some final remarks.

The founder of psychoanalysis, Sigmund Freud, was famously interested in those subconscious patterns of thought that manifest their presence in unhealthy or pathological emotions, thought-patterns, and behaviours, often with devastating consequences for the patient and those around her. Nineteen centuries earlier, Paul spoke in Romans 7 of the *flesh* (σάρξ) in which nothing good dwells, but only *sin* (ἁμαρτία), striving against the "I" (ἐγώ) or "inner person" (ἔσω ἄνθρωπον) or "mind" (νοῦς). This led him to say:

> εἰ δὲ ὃ οὐ θέλω τοῦτο ποιῶ, οὐκέτι ἐγὼ κατεργάζομαι αὐτὸ ἀλλὰ ἡ οἰκοῦσα ἐν ἐμοὶ ἁμαρτία. Now if I do what I will not to do, it

1 See Panayiotis Nellas, *Deification in Christ: Orthodox Perspectives on the Nature of the Human Person*, trans. Norman Russell, Contemporary Greek Theologians 5 (Crestwood, NY: St Vladimir's Seminary Press, 1987), 26–27, 29, 32, 163–164.

2 Eudoxia Delli and Vasileios Thermos (eds), *Soul and Psyche as a Surprise: Psychoanalysis and Orthodox Theology in Dialogue* (Los Angeles, CA: St Sebastian Orthodox Press, 2021).

> is no longer *I* who do it, but *sin* that dwells in me. (Romans 7:20; emphasis mine)

In his conclusion to this poignant passage, he lists three entities—"I," "mind," and "flesh"—of which two, the mind and the flesh, are in conflict, with the third, "I," mediating between them (or rather, suppressing the one in order that the other might flourish):

> Ἄρα οὖν αὐτὸς ἐγὼ τῷ μὲν νοῒ δουλεύω νόμῳ θεοῦ, τῇ δὲ σαρκὶ νόμῳ ἁμαρτίας. So then, *I myself* with the *mind* serve the law of God, but with the *flesh* the law of sin. (Romans 7:25; emphasis mine; I have shuffled the NKJV word structure to match the Greek).

The observant reader will notice the stark resemblance of this threefold schema to the Freudian drama of the *Id-Ego-Superego*. However, the significance of the three aspects is quite distinct. While the Freudian *Id* behaves much like the self-centred Pauline *sarx* or *flesh*, and the *Ego* in both cases plays the mediating role, the Pauline *nous* is far more complex than the merely moralising Freudian *Superego*—it is the reflection of the divine nature of *Logos* and ultimately destined to union with God and to drawing the whole person, including *sarx* and *egō*, into that divine communion. Comparing the views of Paul and Freud, we see here both strong similarities and substantial differences. It is against this backdrop that the volume under consideration explores these kinds of interactions between psychoanalysis as it is practiced today and contemporary Orthodox Christian theology and pastoral practice.

That it focuses on *Orthodox* Christianity makes this collection of contributions unusual. In a way, this Eastern Christian tradition is more comfortable with symbolism, imagery, and metaphor, such as those associated with psychoanalysis, than it is with prose and proposition. No wonder a number of authors argue (quite plausibly) that psychoanalysis is the wayward daughter of Christian spirituality, mysticism, and symbolism—core principles in Orthodox Christianity.

In the West, the Christian exploration of human complexity was propelled forward by Augustine's introspective and insightful *Confessions*, but in the past century and a half or so interest in our hidden inner workings—over time, socially, and in relation to our environment—has experienced an explosion in the breadth and depth of this kind of inquiry. One of the most interesting and controversial ways of exploring human interiority is psychoanalysis, broadly defined as a theoretical model of how our psyche functions (and malfunctions), together with a clinical approach based on that model. It was pioneered (or at least popularised) by Sigmund Freud. Iris Murdoch wrote,

> What seems to me, for these purposes, true and important in Freudian theory is as follows. He sees the psyche as an egocentric system of quasi-mechanical energy, largely determined by its own individual history, whose natural attachments are sexual, ambiguous, and hard for the subject to understand or control. Introspection reveals only the deep tissue of ambivalent motive, and fantasy is a stronger force than reason. Objectivity and unselfishness are not natural to human beings. Of course Freud is saying these things in the context of a scientific therapy which aims not at making people good but at making them workable.[3]

Thus, psychoanalysis *in the wild*, so to speak, has a substantially different purpose to Christian pastoral care, not to mention different assumptions and methodology. *Soul and Psyche* is an exercise in bridging the gap, bringing the two worlds into dialogue with each other, exploring the territories they can and cannot occupy together, and pointing to fruitful directions in which this exercise might proceed in the future.

This collection of essays arises from a vibrant discussion currently ongoing in Greece. The editors, Eudoxia Delli and Vasileios Thermos, have to date convened eight conferences on the topic, and this volume represents proceedings of the most recent of these—held within the project "Science and Orthodoxy around the World" (Nation-

3 Iris Murdoch, *Existentialists and Mystics: Writings on Philosophy and Literature* (Penguin, 1998), 341.

al Hellenic Research Foundation, Athens). While there is an ample literature in Greek on this discussion (including a dedicated journal, *Psychis Dromi*), this volume may well be the first substantial publication on Orthodox views on psychoanalysis in English. It reflects a change in the landscape. Up until recently, conservative Greek Christians have tended to oppose psychoanalysis, while those who embrace the rational approach of psychoanalysis have tended to be antagonistic to the church. However, over the past twenty years, these two extremes have been shrinking and a new cooperative and convergent approach has become dominant (at least in academic circles).

As the incidence of emotional dysfunction continues to grow in our increasingly complex and confusing world, and clergy and lay pastoral workers become increasingly aware of their limitations in dealing with it effectively, it becomes more urgent to bring psychoanalysis and faith into conversation. The essays collected in this volume also reflect a more recent trend in the international psychoanalytic community to restore a sense of the importance and value of religion in psychoanalysis. Psychoanalysis is becoming less intrinsically secular and atheistic—surely a healthy trend, if for no other reason than that religion continues to play a crucial role in the lives of the vast majority of people on earth today. In this article, I offer a review from the perspective of a retired physician, a philosopher, and an Orthodox parish priest; someone who has a passing acquaintance with the field of psychoanalysis but is neither an expert nor a practitioner in the field.[4]

Overview of the Volume

As well as a useful "Introduction" and "Epilogue," the book is comprised of eleven chapters in five parts: "Mapping the Domain"; "Epistemological Explorations"; "Shared Conceptual Journeys"; "Common Clinical

4 Readers seeking the views of someone closer to the field will find it in Gallagher's recent excellent review of this and four other books on the topic. Brandon Gallagher, "Psychological Truth Leads to Theological Truth: Recent Works on Theology and Psychoanalysis," *Journal of Orthodox Christian Studies* 5:2 (2022): 273–282, esp. 279–280.

Paths"; and "A Landscape of Fruitful Encounters." Footnotes and references provide a broad and rich resource to anyone seeking to explore these issues and contexts further. A very useful select bibliography of Orthodox and non-Orthodox authors, and comprehensive Scripture, Subject, and Name indices complete the tome. The editors provide a useful list of theological terms and their sense in current Orthodox usage in relation to the modern world: *theosis*; theological anthropology; patristic; *nepsis*; ontology, *logoi*; and apophaticism.[5] No such glossary of psychoanalytical terms is provided, possibly on the assumption that readers will already be familiar with these.

Readers outside these two fields will find much of interest in a volume that deals, after all, with matters that are universal in human experience. However, many of the essays collected here use the rather technical concepts and language of Continental philosophy which will seem odd and somewhat opaque to readers unused to that tradition. Here is an example, the opening paragraph of Jevremović's chapter: "Human personality is a paradoxical outcome of the (ontogenic) process of *colonization of emptiness*. This emptiness is *protohuman* and *not-yet-personal*. Being a personality implies becoming *the colony of the Other*."[6] It is helpful to keep this in mind when one comes across a bald and confident statement such as the following: "Human desire is not a biological phenomenon."[7] It is beyond doubt that there is a biological or physiological component to human desire that involves defined locations in the brain, certain neurotransmitters, and so on. But in the language of Continental philosophy, raising such an objection is far too coarse and unimaginative, and misses the point the author is making here: that within the current psychoanalytical paradigm, the biological plays only a small role. Rather, desire may be understood (and therapy applied) as something that arises from the relationship between the self and "the Other," and always gives rise to conflict. That said, readers unfamiliar with this style of writing should not be put off by this as

5 Eudoxia Delli and Vasileios Thermos, "Introduction," 20–23.
6 Petar Jevremović, "Orthodox Theology and Psychoanalysis Facing the Other," 177.
7 Jevremović, "Orthodox Theology and Psychoanalysis," 179.

most of the book is quite comprehensible to those inexperienced in the Continental tradition.

On this note, in what follows I describe some of the key themes of the volume.

The Relationship between Psychoanalysis and Orthodox Theology

First, the contributions gathered in this volume have much to say on the relationship between psychoanalysis and the Christian faith—including the prevalent *antagonistic* perception that spurred this contemporary Hellenic discourse in the first place. In my own pastoral experience, I have met Orthodox Christians whose attitude to any kind of modern psychology might be more at home at a Scientology centre,[8] denoting a deep mistrust coupled with scorn. Psychoanalysis, with its overtones of weird Freudian theories that reduce the complexity of the human mind down to basic physiological drives is held in particular disregard. This attitude has various causes. Emmanouilidis amusingly ponders whether a kind of omnipotence complex in some priests might lie behind their resentment of psychologists seeing members of their flock.[9] As Bishop Maxim points out, there are grave misunderstandings on both sides.[10] Not only are there sceptics of psychology in the church—psychologists often misunderstand Orthodox Christianity, if they have an idea of its existence at all, thinking that Christian thought is exhausted by the dichotomy of Catholic and Protestant. But, we discover throughout this volume, Orthodox Christianity offers unique insights.

In the bishop's words, the value of this volume, then, consists in that "the authors display a remarkable ability to penetrate critically yet constructively the thought of both the Church Fathers and that of mod-

8 Scientology is a controversial modern organisation that denounces psychiatry and psychology, and bans its members from using them.

9 Konstantinos Emmanouilidis, "Clinical Implications in the Work of Clergy—Spiritual Fathers and Psychiatrists—Psychoanalysis," 126.

10 Bishop Maxim Vasiljević, "Foreword," 8.

ern psychologists."[11] The authors explore this relationship with considerable balance and insight. Harris lists five reasons (though he calls them "consequences") for the tension between psychoanalysis and religion: psychoanalysis is not "religious" in nature; displays religious dogmatism and devotion to the mind; has Freud's atheism at its origin; is often self-centred; and has no ontological base.[12] In their introduction, the editors, Delli and Thermos, discuss some similarities and differences between psychoanalysis and Christian pastoral approaches,[13] while in her chapter Delli also offers her own overview of commonalities and differences.[14] Furthermore, Christopolou discusses interesting parallels between psychoanalytic concepts and Christian pastoral care (e.g., the silence of God and the silence of the therapist),[15] while Muse offers an insightful comparison between the purpose and practice of the two fields.[16]

This comparative approach is not the only method at work. In his chapter, Harris describes the reception of psychoanalysis across Christian denominations, an often stormy tale.[17] This kind of tension between faith and the prevailing science of the time is nothing new in Christian history. In the late second century, Tertullian decries those who dabble in philosophy with the now-famous catchphrase,"What indeed has Athens to do with Jerusalem? What concord is there between the Academy and the Church?"[18] And he has had many heirs through-

11 Bishop Maxim, "Foreword," 7.
12 Steven-John Harris, "Truth is a Two-Edged Sword: A Brief History of Psychoanalysis and Christianity," 34–35.
13 Delli and Thermos, "Introduction," 13.
14 Eudoxia Delli, "The Interdisciplinary Encounter of Orthodox Theology and Psychoanalysis as a Key Aspect of the Dialogue Between Orthodoxy and Sciences: Initial Thoughts Based on the First Mapping of the Field," 58.
15 Vassiliki Piyi Christopoulou, "Frustration and Deprivation as the Cornerstone of Progress in the Context of Psychoanalytic Treatment as well as in Pastoral Care and Orthodox Theology," 159–160.
16 Stephen Muse, "Shame and Overcoming the Mechanisms of Defense in Response to Sin and Trauma: Reflections on Psychoanalysis and Orthodox Christianity as 'Cures of Love'," 150–151.
17 Harris, "Truth is a Two-Edged Sword," 27ff.
18 Tertullian, *The Prescription Against Heretics* 7, in *Latin Christianity*, Ante-Nicene Fathers 3, ed. A. C. Coxe, trans. P. Holmes (Edinburgh and Grand Rapids, MI: T&T Clark and Wm. B Eerdmans Publishing Company, 1885), 246.

out Christian history. But there is another school of thought that would disagree with Tertullian et al.:

> An equally important, and ultimately more widespread, attitude toward philosophy was expressed by Justin Martyr (105–65), Clement of Alexandria (150–215), and Origen (185–254). Philosophy is a preparation for the gospel … It is important to notice, however, that while these doctrines make a positive evaluation of Greek philosophy possible, they also imply philosophy's inferiority to revelation. The loan hypothesis implies that the truths found in philosophy are fragmented and mixed with error … Even so, philosophy isn't just a preparation for the gospel. Both Clement and Origen believe that our blessedness consists in knowing or understanding the Good, and that philosophy can be employed to deepen our understanding of the truths of scripture in which that Good reveals itself. The seminal treatment of this theme is Augustine's. Revelation is a safer and surer guide to truth than philosophy … Augustine's attitudes toward philosophy are echoed by Anselm and dominate the Christian Middle Ages. Modern Christian attitudes toward philosophy are, on the whole, variants of those seminally expressed by Tertullian and Augustine. Closer inspection reveals that the two views are not always as sharply opposed as at first appears.[19]

The contributors to *Soul and Psyche* adopt the cooperative spirit of Justin, Clement, and Origen, together with their discernment and awareness of the limitations and errors of "secular" sciences. This balanced approach is beautifully illustrated by the editors, who point out that "psychoanalysis and Orthodox theology are not of the same view about human beings, as the former is a discipline that emerged out of a *materialistic* context, while the latter believes in and studies divine-human realities."[20] But they then go on to observe, "psychoanalysis now explicitly

19 W. L. Wainwright, "Christianity," in *A Companion to Philosophy of Religion*, 2nd edn, ed. C. Taliaferro, P. Draper, and P. L. Quinn (Blackwell, 2010), 59–66, esp. 63–64.

20 Delli and Thermos, "Introduction," 13.

admits that *healthy religious faith* exists, undoing Freud's insistence that religion is a sign of immaturity; this is undoubtedly great progress."[21]

Of some interest are the rather speculative discourses on the influence of Christianity upon both the principles and the methodology of psychoanalysis. For instance, Kyriazis' chapter explores the Christian roots of psychoanalysis;[22] Loudovikos discusses various authors who assert that the modern theory and practice of psychoanalysis is built upon the assumptions of the Judeo-Christian concepts of the soul and its journey;[23] and Tympas asserts that, given that patristic anthropology and psychoanalysis both drew on the same sources—Christian scripture and Greek philosophy, albeit with very different ontological foundations—going back to these common roots should highlight the commonalities between them, a project he attempts in his chapter.[24] Harris looks at the other side of the coin—why did psychoanalysis attempt to explain religion away?[25] In turn, Alexandridis offers a fairly balanced analysis of Freud's theories on the psychoanalytic roots of religious belief.[26]

Interdisciplinarity

This book is therefore an instance of the kind of *interdisciplinarity* that is fast becoming not only desirable, but virtually essential in many fields of inquiry. As Thermos has written elsewhere, "the future of the sciences lies at their borders, not within their respective inlands."[27] This kind of cooperation does not happen easily, but requires intention,

21 Delli and Thermos, "Introduction," 13.
22 Dimitrios Kyriazis, "Influences of Christian Thought in Psychanalytic Theory and Practice," 83ff.
23 Nikolaos Loudovikos, "Theology and the Discovery of the Unconscious: Preliminary Remarks," 165ff.
24 Grigorios-Chrysostom Tympas, "Discussing Epistemology and Methodology for Bridging the Gap Between Patristic Anthropology and Psychoanalytic Thought," 61.
25 Harris, "Truth is a Two-Edged Sword," 38–40.
26 Athanasios Alexandridis, "The Creation of the Religious into the Psychic Space," 42–45.
27 Vasileios Thermos, "A Review of the Workshop: Psychoanalysis and Orthodox Theology (2018)" (unpublished, kindly provided by the author).

perseverance, and a willingness to work through past prejudices and foster mutual respect and cooperation. Elsewhere, Choi and Richards aptly point out that "for interdisciplinary projects to be successful, participants must come to understand sufficiently well the fields of knowledge involved to make collaboration possible, and for this to happen knowledge has to be shared."[28] It is precisely this kind of knowledge and sharing that runs through the whole volume under consideration.

In disciplines such as philosophy, interdisciplinarity has recently extended to include Eastern philosophies and religions, and of course, both Catholicism and Protestantism have long histories of intersecting faith with secular arts and sciences, although that interaction has waned significantly in modern times. What has been remarkably rare thus far is for Eastern Christian theology to be invited to the interdisciplinary table, at least in the anglophone world. I believe this to be a substantial loss to both parties.

Eastern Christianity is certainly no exception to the universal pastoral dictum that one must always serve the *whole* person: spirit, mind, heart, and body. Any programmes of spiritual care that ignore the principles of psychological care or mental health are liable to disaster. Psychoanalysis, as the authors here point out, provides a valuable service by focusing our attention on the often neglected *subconscious* aspect of human life that covertly influences so much of our thought and behaviour, therefore our relationships with God and people. In this vein, Delli discusses "four cores" of this interaction: the Orthodox priest as healer; the need for an authentically Christian anthropology that is nuanced and informed by modern scientific insights; awareness of the limitations of Enlightenment anthropocentrism; and identifying and bracketing out certain traditional cultural aspects of Christian thought that have become unhelpful today.[29] In turn, Kyriazis offers a fascinating discussion of the translation of standard Freudian concepts

28 S. Choi and K. Richards, *Interdisciplinary Discourse: Communicating Across Disciplines* (Palgrave Macmillan, 2017), 105.

29 Delli, "The Interdisciplinary Encounter," 54–55.

by Bion (and others, such as Jacques Lacan) into the language of Plato, Meister Eckhart, and Orthodox patristic theology.[30]

Human Nature (Theological Anthropology)

Another central topic discussed throughout this volume is theological anthropology. Our collective conception of what it is to be human in the modern world continues to evolve. Much modern psychotherapy assumes, whether implicitly or explicitly, a materialist and reductionist anthropology: human beings are just clever biological machines, and psychotherapy is about bringing their malfunctions into the open and finding ways to restore them to normal function. But the authors in this book make a strong case that psychotherapy is by no means *intrinsically* reductionist. Accordingly, they demonstrate its (mostly) smooth accommodation to the Orthodox Christian spiritual tradition.

A common theme that threads through the chapters is that psychotherapeutic practice is at its heart another manifestation of traditional Christian spiritual growth. Here are just three examples. Kyriazis points out that both Christian life and psychotherapy aim at uncovering "absolute Truth" and thereby reversing the tendency to "psychic death" that besets us.[31] Christopoulou, in turn, connects the parallel roles of deprivation in both Christian ascetic practice and psychotherapeutic progress.[32] Finally, Loudovikos sketches psychotherapy's fundamentally theological character as a practice in search of the fullness of human nature, holistically embracing both the conscious and the subconscious.[33] However, this is not to be taken as a complete identification between the two fields. The differences between them are also highlighted and discussed. Thus, Tympas points out that while the strategy of psychoanalysis is to reorganise pathological thought-patterns into healthier ones, Christian practice reorients the person to-

30 Kyriazis, "Influences of Christian Thought," 96–99.
31 Kyriazis, "Influences of Christian Thought," 100–101.
32 Christopoulou, "Frustration and Deprivation," 155ff.
33 Loudovikos, "Theology and the Discovery of the Unconscious," 165ff.

wards the divine presence and will. Christianity thus includes certain ontological commitments absent from psychotherapy.[34]

Apophatic or Mystical Theology

One last fascinating theme that may be less familiar to some Western readers is the apophatic and/or mystical approach that plays a central role in much Eastern Christian theology.[35] Mystical theology is understood in Christianity as a way of approaching God that fully respects divine essential incomprehensibility and transcendence beyond the capacity of any created minds. Thus, apophaticism and negative theology—the preference for stating what God is *not*, rather than limiting God by stating what God *is*—is the natural language of mystical theology. To give a classical example, Evagrius Ponticus shows that "God cannot be comprehended by the mind. For if he falls into being comprehended, he is certainly not God."[36]

This topic arises both explicitly and implicitly in many of the chapters collected within the volume under consideration. Delli highlights the "mystical turn" in psychoanalysis due to Donald Winnicott and Wilfrid Bion (both of whose ideas are further discussed in a number of chapters), and provides core references to this trend in a footnote.[37] Emmanouilidis, in turn, points out the important difference between the goal of the scientific method, which is knowledge, and of mystical theology, which is participation in the ultimate, ineffable reality.[38] Both he and the other authors who touch upon the topic focus more on similarities and connections that are, in practice, discernible between psychoanalysis and mystical theology. Emmanouilidis him-

34 Tympas, "Discussing Epistemology," 63–73.
35 Differences between East and West on this topic have at times been drawn quite sharply, but opinion seems to be coming around to seeing these more as differences in emphasis rather than differences in substance. See, for example, the contributions gathered by G. Demacopoulos and A. Papanikolaou (eds) in vol. *Orthodox Constructions of the West* (Fordham University Press, 2013).
36 Evagrius Ponticus, *On Eight Thoughts*, PG 40:1275C (my translation).
37 Delli, "The Interdisciplinary Encounter," 57.
38 Emmanouilidis, "Clinical Implications," 123ff.

self goes on to explore the "mystical turn" taken by Bion as part of his very readable and practical discussion of how psychoanalysis can enrich Christian pastoral care.

Furthermore, Alexandridis points out that both psychological and mystical experience share a *paradoxical* nature.[39] Almost by definition, he continues, mystical experiences involve the paradoxical concurrence of opposites. The experiencer is both fully oneself and ecstatic ("beside oneself"). The same goes for the object of experience: God is experienced as both immanent and ineffable—"You were deeper within me than my innermost depths and higher than my highest parts."[40] And those who experience trauma also experience this coincidence of opposites:

> I return to our patients. In some of them a very early traumatic experience has elements of an involuntary mystical experience. What else is a mystical experience if not the ability to assume all positions, to be both dead and alive, gripped by passion and apathy, alone and with God, sane and insane, in order to be inhabited by that which is impossible to conceive through thinking?[41]

Having read this volume, I am indeed struck by how closely certain strands of psychoanalysis follow the patterns of mystical theology.[42] This may be in part due to influences, whether overt or covert, of the older tradition on the more recent science. Kyriazis argues that Bion was clearly influenced by the mysticism of St John of the Cross.[43] Reflecting perhaps conscious paths of influence, Loudovikos, following Suzanne Kirschner, considers psychoanalysis a secular iteration of

39 Alexandridis, "The Creation of the Religious," 47.
40 Augustine of Hippo, *Confessions* 3.6.11, in *St Augustine: Confessions*, The Fathers of the Church 21, trans. V. J. Bourke (Washington, DC: The Catholic University of America Press, 1953), 62.
41 Alexandridis, "The Creation of the Religious," 47.
42 Apophaticism and mystical theology are not exclusive to Christianity of course, although references to non-Christian traditions rarely appear in this volume. Plato is mentioned a few times, and Plotinus once, although he fails to earn an Index entry.
43 Kyriazis, "Influences of Christian Thought," 94–95.

Christian mystical theology, where Romanticism replaces God with nature and soul with the individual mind.[44] Jevremović agrees, stating that "psychoanalysis could be seen as a form of secular apophaticism."[45] Somewhat more controversially, Kyriazis even goes so far as to say that there has been so much convergence between the two recently, that "I therefore consider that there is no need for any sacred psychoanalysis or for any spiritual or mystical psychoanalysis."[46] I find this claim a little hard to accept, especially in light of the differences between the two fields described in the rest of the volume.

Lest the reader think this book consists in nothing other than academics wrangling over minutiae, I wish to point out that very real and practical insights permeate most of the chapters. For example, Tympas points out that:

> Modern society as a collective body, involves different requirements for adaptation and thus subjects (post)modern individuals into conditions and pathologies that cannot be tackled with ascetic or other spiritual means alone, as it seemed to be the case in the early Christian era … Depression, for instance, cannot be explained only as a result of a "spiritual void" or an absence of God in the life of the patient, but could be equally attributed to other social and personal parameters, aspects of upbringing, insecurities, lack of social interaction, and so forth.[47]

A particularly blunt diagnosis of problems in the culture of both contemporary psychoanalysis and Orthodox theology makes for lively reading in Jevremović's chapter[48] and affords a very realistic balance to the more hopeful note struck by other authors. And in the "Introduction" we read that the value of psychoanalysis for Julia Kristeva is that it is a reminder to us of the dangers of overly confident, overly dogmatic religion (or science, for that matter). Just as psychoanalysis deals with

44 Loudovikos, "Theology and the Discovery of the Unconscious," 169–171.
45 Jevremović, "Orthodox Theology and Psychoanalysis," 187.
46 Kyriazis, "Influences of Christian Thought," 101.
47 Tympas, "Discussing Epistemology," 78–79.
48 Jevremović, "Orthodox Theology and Psychoanalysis," 180–185.

the deep and mysterious depths of the human self, true theology deals with the deep and mysterious depths of the divine. Delli and Thermos comment, somewhat psychoanalytically:

> … her hint is that those Christians who bear many certainties can become dangerous. Unfortunately, cradle Orthodox congregations suffer from an endemic overdose of certainties, which they invest in collective identity formation. In other words, certainties combined with adherence to local aesthetics have shaped the phenomenon of "cultural Orthodoxy," which hinders access to the very core of the Christian message; it definitely needs the encounter in order to be analyzed and diminished.[49]

I dare say that Orthodox Christians are not unique among Christian traditions—nor religious traditions more generally—in earning this diagnosis.

Conclusion

Not being educated in this field, when I began reading this book, I had a vague narrative in my head: psychotherapy began with Freud, who developed some valuable methods, but sometimes employed them in somewhat fantastical or misguided ways. Over the years, his "classical" psychotherapy has evolved in various directions that remedied his excesses and strengthened aspects that are clinically effective. On finishing the book, that simple picture has been greatly deepened and broadened from a distinctly Orthodox Christian perspective, and there were even a few "surprises" as intimated by the title. Those deeply involved in the world of psychoanalysis will no doubt find opinions with which they disagree within its pages, but for a reader like me, with only a passing familiarity with that world, I found much food for thought and reflection on the pastoral side of my daily life.

Thermos begins his "Epilogue" with this quote from Lila Kalinich:

49 Delli and Thermos, "Introduction," 23.

> This is our world, our society, our culture, therapeutic or not. God gave us Freud; and for some reason, however obscure, He made Freud the major proponent of spiritual tools to which the Church originally laid claim. So Freud is ours, and ours too is Psychoanalysis.[50]

Minor gripes aside (e.g., the somewhat opaque language in certain chapters) this book is a veritable treasure trove for anyone interested in the intersection between a modern secular science and an ancient (yet vibrant) Christian tradition. Here will the reader find not only ample food for thought and inspiration for therapeutic and pastoral practice, but also a comprehensive database of further sources to explore. And it provides an admirable model of how faith and science can be brought into richly fruitful dialogue, to the mutual benefit of both.

The author reports there are no competing interests to declare.
Received: 25/09/23 Accepted: 30/11/23 Published: 11/12/23

50 Thermos, "Epilogue," 189.

Maria Sibylla Merian in Picture Books: Metanarratives about Science and Religion

Danielle Terceiro

Abstract: This article considers three picture book biographies of the artist and scientist Maria Sibylla Merian, and the metanarratives on science and religion that are embedded in each. Merian is famous for her detailed drawings of the lifecycle of insects within their ecosystem and for rejecting the old theory of spontaneous generation, which still had currency in Europe. The picture books bring to the fore Merian's scientific curiosity and her skills of observation that swept away old superstitions about insects. The metanarratives cued through the visual imagery of her picture books ignore the underpinnings of Merian's Calvinist faith in her commitment to portraying the details of insect ecosystems. These metanarratives also ignore Merian's emergence as an entrepreneur within Protestant society and her contributions to the commodification of "exotic" nature in a colonial context.

Keywords: Calvinism; entomology; insects; Merian; metamorphosis; picture books

Maria Sibylla Merian (1647–1717) lived in Germany and the Netherlands in the period after the European Thirty Years' War (1618–1648). Even though she was a woman with no formal training and had less

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Danielle Terceiro is completing a PhD by publication at Alphacrucis University College, considering how multimodal texts such as picture books and graphic novels make meaning through the interaction of word and image. This article was prepared with the financial support of ISCAST's Integrate Award. The author would like to thank the reviewers of this article for their very constructive and insightful feedback.

access to artistic resources than her male peers, she became famous for her detailed drawings of the lifecycle of insects in their natural environments. Merian completed her work at a time when Europeans were moving away from old ideas about spontaneous generation and metamorphosis. This article will undertake an analysis of three picture book biographies of Merian's life: *The Bug Girl: Maria Merian's Scientific Vision*, by Sarah Glenn Marsh and Filippo Vanzo (2019); *The Girl Who Drew Butterflies: How Maria Merian's Art Changed Science*, by Joyce Sidman (2018); and *Summer Birds: The butterflies of Maria Merian*, by Margarita Engle and Julie Paschkis (2010). The analysis of these biographies aims to identify the contemporary metanarratives that seek to present a relationship between religious belief and science as it existed in the early modern period.

Metanarratives are the "implicit and usually invisible ideologies, systems, and assumptions which operate globally in a society to order knowledge and experience."[1] The metanarratives at play portray Merian as a kind of secular saint who helps the modern world move out of superstitious darkness. They draw on figurative connotations from her work and ideas about metamorphosis and transformation to suggest a move to a world of science without superstition or magic. This way of telling Merian's life for a young audience can be understood as secular hagiography. If we understand a religious hagiography as a categorical lens through which we can study "the construction and promotion of embodied perfected ideals of religious truth,"[2] then the picture books can be seen as construing and promoting Merian as an "embodied perfected ideal" of the modern scientific method. The metanarratives that are at play largely ignore the theological resources that Merian brought to her vocation, as well as the religious beliefs that informed the approaches to entomology in Merian's time. It is important to note

1 John Stephens and Robyn McCallum, *Retelling Stories, Reframing Culture: Traditional Story and Metanarratives in Children's Literature* (New York and London: Taylor and Francis, 1998).

2 Massimo A. Rondolino, "Some Foundational Considerations on Taxonomy: A Case for Hagiography," *Religions* 10:538 (September 2019): 5.

that this article is concerned primarily with the ideological effects of the text, rather than the intention of the author. It may be that a text incorporates the unexamined assumptions of the author, or that there are inconsistencies that betray an unconscious bias. What I assert is not that any author is "anti-theological," but that the interplay of word and image in these picture books proposes a certain story about the relationship between science and religion in the early modern period. The three sections that analyse the picture books will be followed by a discussion of the theological stories that may have been overlooked in the retelling of Merian's life. I will then undertake to find out how these overlooked stories nuance our understanding of the emergence of modern science.

Maria Sibylla Merian: Background

Merian grew up in a Calvinist household in Frankfurt, Germany. Her stepfather, Jacob Marrel, was a still life painter and included Merian in the lessons he gave to his students.[3] From around 1600, insects had started to be incorporated prominently within still life paintings.[4] Merian also learnt the process of copper engraving with her half-brothers at the family's printshop.[5] Merian noted of her upbringing that "I was always encouraged to embellish my flower painting with caterpillars, summer birds [butterflies] and such little animals in the same manner in which landscape painters do in pictures, to enliven the one through the other, so to speak."[6] Merian would have had access within Marrel's household to dead, dried insect specimens stuck on pins for artists

3 Sarah Pomeroy and Jeyaraney Kathirithamby, *Maria Sibylla Merian: Artist/Scientist/Adventurer* (Los Angeles: The J. Paul Getty Museum, 2018), 13.

4 Eric Jorink, "Insects, Philosophy and the Microscope," in *Worlds of Natural History*, ed. Helen Anne Curry, Nicholas Jardine, James Andrew Secord, and Emma C. Spary (Cambridge University Press, 2018), 131–48.

5 Joyce Sidman, *The Girl Who Drew Butterflies: How Maria Merian's Art Changed Science* (Boston and New York: Clarion Books, 2018), 31.

6 Pomeroy and Kathirithamby, *Maria Sibylla Merian*, 15.

to use as models.[7] Merian became fascinated by insects in their natural environment, and she began observing and drawing the lifecycle of the silkworm within its own ecosystem. She also began observing the butterflies and moths that emerged from other caterpillars. At age thirteen she made the following decision: "I set aside my social life. I devoted all my time to these observations [of insects] and to improving my abilities in the art of painting, so that I could both draw individual specimens and paint them as they were in nature."[8]

Merian married one of her stepfather's apprentices, Johann Andreas Graff, and moved to Nuremberg in 1668. Their place had a garden, where Merian grew flowers and observed and collected insects.[9] She painted and drew on silk and linen, as well as on vellum, decorating tablecloths with painted birds and butterflies.[10] She taught embroidery and painting to the daughters of several wealthy Nuremberg families, referring to these students as her "company of maidens," and she worked with them on projects that used techniques she had devised for colourfast painting onto fabric, including a tent for an army general who "desired to have his field quarters designed to give him the illusion of living in a garden house full of birds and flowers."[11] In 1675, Merian published her *Neues Blumenbuch* (New Flower Book), the first of a three-part series of illustrated floral designs for use in embroidery and needlework design.

Merian continued to breed and draw insects after she moved with her husband and two daughters to Amsterdam.[12] In 1679, her first *Der Raupen* (caterpillar) book was published: *Der Raupen wunderbare Verwandelung und sonderbare Blumennahrung* (The Wondrous Transformation of Caterpillars and Their Remarkable Diet of Flowers). A sec-

7 Pomeroy and Kathirithamby, *Maria Sibylla Merian*, 15.
8 Pomeroy and Kathirithamby, *Maria Sibylla Merian*, 15.
9 Pomeroy and Kathirithamby, *Maria Sibylla Merian*, 26.
10 Pomeroy and Kathirithamby, *Maria Sibylla Merian*, 26.
11 Janice Neri, *The Insect and the Image: Visualizing Nature in Early Modern Europe 1500-1700* (Minneapolis: University of Minnesota Press, 2011), 139.
12 Grace Touzel, "Maria Sibylla Merian: Artist and Explorer," in *Nature's Explorers: Adventurers Who Recorded the Wonders of the Natural World* (London: Natural History Museum, 2019), 8.

ond part of this was published in 1683. Merian dismissed spontaneous generation in the foreword to her first *Raupen* book, stating that all animals that she had studied were the result of sexual reproduction, and that was the end of the matter.[13] Merian and her husband separated, and for six years Merian lived in a Labadist religious community in Friesland along with her daughters, her mother, and her brother. Merian compiled her *Study Book* with notes and observations, pasting in earlier material.

In 1699, Merian and her youngest daughter Dorothea travelled to Surinam in South America. They visited sugar plantations and wilderness areas to sketch local insects and plants. When they returned to Amsterdam, in 1701, Merian set about producing a book with coloured prints of her Surinam observations. She noted her desire to produce a work to "please both the connoisseurs of art and the amateur naturalists interested in insects and plants."[14] *Metamorphosis insectorum Surinamensium* was published in 1705. It was published in Dutch and Latin, and measured twenty-two inches high.[15]

Contemporary scientists treat Merian's naturalist drawings as accurate portrayals of insect metamorphoses and ecosystems, and the drawings have been used as the basis for the scientific classification of species. Carl Linnaeus, for example, based several classifications solely on Merian's work when he classified the 4,400 insect species known to him in his work *Systema Naturae* (1758).[16] In the past decade, there has been a renewed interest in Merian's life and work, with art and natural history museums exhibiting and publishing books on her life and contributions.[17] The three picture book biographies function to induct

13 Hans Mulder, "Spontaneous Generation and Miraculous Transformations: Reproduction and Growth of Crawly Creatures," in *Crawly Creatures: Depiction and Appreciation of Insects and other Critters in Art and Science*, 93–102, ed. Hans Mulder, Jan de Hond, and Eric Jorink (Amsterdam: Rijksmuseum, 2022), 97.

14 Touzel, "Maria Sibylla Merian," 14.

15 Sidman, *The Girl Who Drew Butterflies*, 110.

16 Tony Rice and David Bellamy, *Voyages of Discovery* (London: Allen and Unwin, 2008), 91.

17 For example, Pomeroy and Kathirithamby, *Maria Sibylla Merian* and Touzel, "Maria Sibylla Merian."

children into this museum culture. They draw on the ideas implicit in the material produced for adult audiences and present them in a format designed for a younger audience.

A Metanarrative About Personal Transformation

The Girl Who Drew Butterflies is a 120-page picture book biography of Merian that incorporates reproductions of her work alongside a detailed written biography and historical and scientific notes and images. The "Author's Note" at the end of *The Girl Who Drew Butterflies* describes how Sidman, a poet, tries to "follow in Maria's footsteps" and remove some of Merian's "enigma" by raising caterpillars and attempting to take photos of each stage of their metamorphosis.[18] Each chapter is preceded by a photograph and poem. The photos are labelled with the relevant point in the butterfly lifecycle that is represented. The poems represent a conceptual blending of Merian's work with the lifecycle of a butterfly, and project Sidman's own personal values and experience as bound up with the production of this biography. What is being projected in these photographic and poetic texts at the beginning of each chapter is *parabolic* in the sense of being a story projected from another story (that is, the story of Merian's life). [19] This picture book is not "anti-theological": it notes Merian's motivating belief that all creatures "reflected God's glory … in the infinite variety of his creation."[20] However, the parabolic shape given to this biography by the lifecycle of a butterfly emphasises the self-determination of Merian, and tends to subordinate the importance of faith to her commitment to "her bright spirit"

18 Sidman, *The Girl Who Drew Butterflies*, Author's Note.

19 The concept of "parable" here comes from the cognitive linguist Mark Turner: "Parable begins with narrative imagining—the understanding of a complex of objects, events, and actors as organised by our knowledge of *story*. It then combines story with projection: one story is projected onto another. The essence of the parable is its intricate combining of two of our basic forms of knowledge—story and projection. This classic combination produces one of our keenest mental processes for constructing meaning." Mark Turner, *The Literary Mind* (New York: Oxford University Press), 5.

20 Sidman, *The Girl Who Drew Butterflies*, 64.

and curiosity about butterflies; Sidman sees this as passing "from one generation to the next".[21] Chapter 9, which projects the eclosing of a butterfly onto Merian's time within a religious community, is central to the humanist metanarrative.

Chapter 9 is titled "Eclosing, 1685 Waltha Castle, Wieuwerd, Netherlands." *Eclosing* is the emergence of the adult insect from its chrysalis, and the chapter details the period in which Merian and her daughters entered and then left the Labadist religious community. A note on "Religion in the 1600s" within the chapter concludes with the observation that, "in the 1600s, choosing religious seclusion was a way to flee an intolerable living situation—such as a painful marriage."[22] The concluding pages of the chapter mention that "life in the Labadist community was unravelling. Religious leaders squabbled and left, and money grew tight."[23] Merian "took a hard look at her life," realising that both her daughters had "grown up" over their six years within the community, and that even her youngest, Dorothea, was at "the brink of womanhood" at the age of thirteen.[24] As a result, Merian is said to have "turned her sights on Amsterdam," to consider whether she and her daughters could make a living trading, painting, and selling.[25] The closure of this chapter—Merian "packing up her daughters, her art supplies, and her precious study books" and heading to Amsterdam—is implied to be a form of human eclosing.[26] Merian is emerging from the claustrophobic chrysalis and into the bustle and stimulus of Amsterdam, the implication being that she and her daughters emerged from an immature and passive "pupa" state and into a more self-determinate and creative stage of life.

The photographic image above Chapter 9 and its associated poem use Merian's story to create a parable of self-determination and independence. The photographic image is captioned as showing "a

21 Sidman, *The Girl Who Drew Butterflies*, Author's Note.
22 Sidman, *The Girl Who Drew Butterflies*, 65.
23 Sidman, *The Girl Who Drew Butterflies*, 72.
24 Sidman, *The Girl Who Drew Butterflies*, 72-73.
25 Sidman, *The Girl Who Drew Butterflies*, 73.
26 Sidman, *The Girl Who Drew Butterflies*, 73.

butterfly emerging from its chrysalis," and incorporates the following poem:

> Within
> a shriveled shroud
> I melt, shift,
> change.
> And from darkness
> I wake.
> Crumpled and raw,
> I crawl my way out
> into the light.[27]

The use of the first person in this poem blends three perspectives: that of the butterfly emerging from its chrysalis, Merian and her daughters, and the narrator-poet. The verbs "melt, shift, change" give a sense of mysterious alchemy, and the sibilant alliteration of "shrivelled shroud" gives a sense of degenerate magic or witchcraft. The "darkness" of life in the chrysalis is implied to align with the darkness of life for Merian and her daughters within the Labadist community, and also for a darkness that exists for the narrator poet where there is no "light" illuminating scientific understanding and removing the darkness of superstitious belief. This image and its poem are parabolic in that it appears to provide the gist or the meaning that Sidman has projected from this period of Merian's life, presented in a concise poetic and visual format. The photographic image is labelled simply as "a butterfly emerging from its chrysalis," but the surplus of poetic meaning in the poem invites the readers to project a similar trajectory of transformation from superstition to science and from darkness to light, onto their own life story.

There is some unintentional irony in that Sidman's retelling incorporates a verbal parable from the insect world. It is ironic because Merian's work can be understood as a move away from an "emblema-

27 Sidman, *The Girl Who Drew Butterflies*, 61.

tic" form of insect representation that used the insect world to make a moral or religious point.[28] While Merian was not known to accompany her published illustrations with extensive verbal text, others who were interested in illustrating the insect world took different approaches. In 1590, the artist Joris Hoefnagel compiled his album *The Four Elements*, containing 277 watercolours of living creatures, including insects, and used an emblematic worldview to project meaning from the insect world to the human world. In this worldview, butterflies referred to Christ's resurrection, as the butterfly was believed to arise from the dead caterpillar, and the stag beetle was presented as a reference to Christ himself.[29] The first European to undertake a systematic study of the generation of insects was Johannes Goeddart (1617–1688), and he also took the butterfly as a sign of the resurrection.[30] Jan van Swammerdam (1637–1680) was trenchantly opposed to the depiction of insects in this symbolic manner, and asserted that Goeddart's observations were "foolish," "laughable," and "ridiculous."[31] Merian's work does not engage verbally in the debate about the figurative use of insects but was itself a non-emblematic depiction of insects.

The metanarrative presented in *The Girl Who Drew Butterflies* is one of personal transformation, a transformation necessary to escape the constrictions of a conservative religious community and a difficult marriage. The metanarrative valorises Merian's self-determination in her will to leave the community and strike out on an independent existence on her own. The implication is that Merian left her faith behind, too. However, Merian's period within the Labadist community can be understood as a more complex interaction of religious belief, artistic production, and scientific observation within the community. It is not clear that Merian made an effort to extricate herself from this commu-

28 Eric Jorink, "Between Emblematics and Argument from Design: The Representation of Insects in the Dutch Republic," in *Early Modern Zoology: The Construction of Animals in Science, Literature, and the Visual Arts*, ed. Karl A. E. Enenke and Paul J. Smith (Leiden and Boston: Brill, 2007), 147–75.

29 Jorink, "Insects, Philosophy and the Microscope," 131–48.

30 Jorink, "Between Emblematics and Argument from Design," 158.

31 Jorink, "Between Emblematics and Argument from Design," 162.

nity. Rather, the community's financial woes and some internal conflict may have required its members to disperse and make their own financial way.

For Merian, the link between her engagement with the natural world and her faith seems uncomplicated, as demonstrated in her simple exclamation, "With God!"[32] at the beginning of her *Study Book.* For others, the relationship between this engagement and faith was more problematic. Goeddart quoted 1 Timothy 6:15–16 as a warning against inappropriately penetrating the divine with *curiositas*.[33] Like Merian, Jan Swammerdam studied and recorded the lifecycle of insects, and like Merian, he also spent a period within a religious community, the Schleswig community founded by the mystic Antoinette Bourignon. Swammerdam joined this community after having a religious crisis. While he had originally felt that his empirical investigations were a tribute to God, he now felt that he was worshipping the "idol" of *curiositas* and abandoned his empirical research. Swammerdam had attended meetings of Cartesian rationalists in Utrecht, an activity that would have been frowned on by orthodox Calvinists at the time. Jorink considers that Bourignon's teachings on the importance of self-denial and the imitation of Christ would have been attractive to Swammerdam. Swammerdam had become worried that his adherence to rationalism and fixation on immutable laws of nature had crowded out grace and personal devotion to God.[34] When Swammerdam left Bourignon's community, he took up empirical research again and meditated on the importance of following Christ. Swammerdam's personal rupture be-

32 Tomomi Kinukawa, "Art Competes with Nature: Maria Sibylla Merian (1647–1717) and the Culture of Natural History," PhD diss. (University of Wisconsin-Madison, 2001), 138.

33 Jorink suggests that Goeddart's hesitancy to use *curiositas* to penetrate the marvels of God could explain why he did not use a microscope. Jorink, "Between Emblematics and Argument from Design," 157–58.

34 Eric Jorink, "Maria Sibylla Merian and Johannes Swammerdam: Conceptual Frameworks, Observational Strategies, and Visual Techniques," in *Maria Sibylla Merian: Changing the Nature of Art and Science*, ed. Bert Van de Roemer, Florence Pieters, Hans Mulder, Kay Etheridge, and Marieke van Delft (Tielt: Lannoo, 2022), 171–83.

tween science and faith was apparently healed; Merian seems never to have experienced such a rupture.

A Metanarrative About Social Transformation

In *The Bug Girl,* Merian is presented as a curious young girl, whose interest in insects pitch her against the superstitious adults of her time. It shows her as a teenager, watching silkworms emerging from cocoons. The text on the eighth opening notes that "Maria learned two things that day. First, that there was no such thing as 'spontaneous generation.' And, second, that grown-ups were sometimes wrong." The ninth opening then shows Merian waving and turning away from the adults behind her. This wave is to placate any suspicious adults who are "looking her way" as she tries to gather insects, but it also functions in the image as a dismissal of the old, adult world, and a movement towards something new and different.

The undulating line of grass and leaves that move from left to right across the ninth opening serves to show, visually, the left-to-right movement from the given to the new.[35] The "given" in this opening is the adult world, with its villagers and edifices. The "new" is a fresh engagement with the natural world, and the insects come into play on the right-hand side of this opening. The movement of the caterpillars is in a rightward direction, and the butterflies are shown high on a leaf and hovering above the vegetation. The butterflies on the right-hand page of this opening draw the eye upward towards the book's top right-hand corner, and this composition suggests a movement from the real to the ideal.[36] Merian's movement to engage with nature, on the outskirts of her everyday village life, is presented as something new and ideal,

35 For a description of how the movement from left to right can function as a movement from the given to the new, see Gunther Kress and Theo van Leeuwen, *Reading Images: The Grammar of Visual Design,* 2nd ed. (London & New York: Routledge, 2006), 175–85.

36 For a description of how the movement from bottom to top can function as a movement from the real to the ideal, see Kress and van Leeuwen, *Reading Images,* 186–93.

which makes the adult townsfolk nervous. It is presented as something ideal and something urgent, as though the caterpillars and butterflies risk moving out of a frame of attention if Merian gets too distracted with placating the adults in her world.

The undulating line of grass and leaves in this opening also functions as a boundary to civilisation, and her childish enthusiasm and carrying of a basket into a wooded area evokes the European fairytale scripts that make the forest a place of danger. In *The Bug Girl*, the fairytale schema is inverted by positioning Merian as someone who discovers that the insect world is not one of sinister magic. The text on the right-hand page notes that "their 'shape-shifting' was part of nature, not magic after all. It was better because the insects did it on their own, through the process of *metamorphosis*." In this picture book Merian breaks the sinister spell of superstition by crossing a boundary set by adults—a boundary discouraging curious engagement with the insect world.

The following opening shows Merian transforming society by being a teacher of other females. The left-hand page shows her addressing a company of maidens, and the right-hand page shows her with her two daughters in the forest. *The Bug Girl* depicts the transformative power of a confident teacher, who has to wait until she is an adult to transform the world, because the adult world was not ready to receive Merian's message when she was a young girl. Societal transformation is achieved by engaging young women: the company of maidens and Merian's daughters. Societal transformation is presented as best achieved by facilitating the transformation of those young women whose worldviews have not hardened into old superstition. The left-hand page notes that Merian "gave her students the tools they needed to study whatever interested them—along with a healthy dose of her curiosity." The right-hand page pictures Merian with her two daughters, bending down and showing one a butterfly, while the other daughter observes a caterpillar crawling up a tree at close vantage, touching the tree at the same time. The setting—a grassy opening—is light and open,

suggesting that this wooded area is a safe and appropriate place for an immersive and interactive learning experience.

The metanarrative that is presented in these pages valorises the role of teachers in encouraging "curiosity" and a close-up engagement with nature. This links with contemporary pedagogies, which treat "curiosity" as a virtue and an important spark for learning within the school and for advances in understanding within society. In the early modern period, however, and in Merian's Calvinist context, the concept of "curiosity" was less straightforward. Merian's religious context was the period of the *Nadere Reformatie* (Further Reformation) within Dutch Calvinism, and its emphasis on the heads of households making prudent business decisions to provide for their families. Merian's "curiosity" was inextricably linked to her business sense and her drive to provide for her daughters as matriarch of the household.

Kinukawa contends that Merian's appeal to universal and empirically established scientific truth hides the extent to which her business activities are implicated in European colonialism's racial ideologies. For Kinukawa, Merian is most properly understood as an "entrepreneur" who promoted herself as a curious naturalist, and who, through a commodified exchange of "exotic" nature specimens and her empirical work, reinforced the idea that only whites could become autonomous, private, individual property-owners of knowledge.[37] This is most starkly represented in Merian's trip to Surinam. Merian raised funding for this without any official institutional affiliation, and this form of "curious nature study freed from concerns about immediate profitability was the best method to obtain a knowledge that supported not only individual business and family, but also colonial society and the state simultaneously."[38] Merian's note about slaves in Surinam and their use of abortion herbs to prevent their children "becoming slaves as they are" is oft-quoted to position Merian as sympathetic to the slave's

37 Tomomi Kinukawa, "Science and Whiteness as Property in the Dutch Atlantic: Maria Sibylla Merian's Metamorphosis Insectorum (1705)," *Journal of Women's History* 24:3 (2012): 91–116.

38 Kinukawa, "Science and Whiteness," 101–102.

plight, but Kinukawa draws attention to the fact that Merian makes this observation only to note that slave women "must be treated well. If not, they will have no children under enslavement."[39] Thus, Merian betrays her overriding interest in maintaining a slave society through ostensibly benevolent governance. She is, in fact, channelling the approach of a former governor of Surinam, Cornelis van Aerssen van Sommelsdijk, who often advocated for a more "humane" approach to slaves as a way toward a more productive and virtuous society, and who spent private time investigating local plants and complained that he received little help from "curious" people to collect rare plants, and that there was no expert on hand in the colony to cultivate "useful" plants.[40]

Merian's background in embroidery and still life painting also gave her a visual style that contributed to the commodification of insect specimens within images, and as objects themselves in the marketplace. She presented insects as immobile and specimen-like objects among vibrant, entwining plants, and the way she presented insect lifecycles depended upon fixing insects in precise configurations.[41] The commodification of insect specimens and virtual insect specimens in books were part of a wider trade in natural specimens as objects for display within the curiosity cabinets of the burgher class and the *Kunstkammer* (chambers of art and wonder) of the aristocracy.[42] Merian herself traded in insect specimens, and the funds from this trade alongside the sale of her books allowed her to present herself as an unaffiliated "curious" naturalist in Surinam.[43] As well as selling her publications she ran a family business selling natural objects such as dead butterflies and toads from the Dutch East and West Indies preserved in jars.[44]

Merian's Labadist connections embedded her within colonialist concerns that had a vested interest in selling a version of the "exotic"

39 Kinukawa, "Science and Whiteness," 104.
40 Kinukawa, "Science and Whiteness," 101.
41 Neri, *The Insect and the Image*, 174.
42 Neri, *The Insect and the Image*, 5.
43 Kinukawa, "Art Competes with Nature," 296.
44 Kinukawa, "Science and Whiteness," 92.

to Europeans. A group of Labadists had travelled to Surinam in 1684 prompted by their belief in the imminent return of Christ and in hope of establishing a New Jerusalem on the banks of the River Surinam. This settlement was named "La Providence" and was several days' journey from the main European settlement.[45] Two Labadist expeditions were made to Surinam in consecutive years, and both ended in disaster, with disease and piracy undermining the community. The governor of Surinam at the time, Sommelsdijk, had two Labadist sisters who each went on one of the expeditions and were influential within the Friesland community where Merian lived. While she was living in this community Merian would have had access to letters detailing the misery of these expeditions, as well as the war with the indigenous populations of Arawaks and Caribs.[46] She would have also been able to inspect some specimens that Sommelsdijk had sent back from Surinam, including large azure butterflies and a large stuffed tree snake that had been caught and mounted by indigenous people.[47] When Merian visited Surinam herself she stayed for a couple of weeks with some Labadists who had been able to stay on and manage a plantation with external help, and she recorded that she "made various observations of insects."[48]

Merian's ambition to represent the insect world can thus be understood as part of an entrepreneurial drive linked to her need to provide for her immediate family and also linked to the colonial aspirations of her religious community and the commodification of insects and other specimens from nature. The metanarrative of *The Bug Girl*, with its emphasis on Merian sharing her scientific vision through her mother-daughter and teacher-student relationships, obscures this wider world of business and vested interest in producing and selling images of the natural world.

45 Ella Reitsma, *Maria Sybilla Merian and Daughters: Women of Art and Science* (Zwolle: Waanders Publishers, 2008), 93, 172.
46 Reitsma, *Maria Sybilla Merian and Daughters*, 173.
47 Sidman, *The Girl Who Drew Butterflies*,70.
48 Reitsma, *Maria Sybilla Merian and Daughters*, 192.

A Metanarrative About Historical Transformation

The metanarrative of *Summer Birds* is a story about the transformation of history from a dark, superstitious period fixated on the abject and the monstrous, towards a new illuminated, airy, and capacious historical reality. The seventh opening in *Summer Birds* moves the reader from a dark, static period, where people are entrenched in mud and surrounded by abject and sinister forms, to the sharp contrast of a representation of Merian with a pleasingly aesthetic use of negative space, as in her drawings. Merian's grasp of the plants suggests that nature is under her easy control, and indeed her grasp in both hands almost makes it look like she is conducting a symphony of nature.

Summer Birds also uses a shift from darkness to light, as depicted in the changing colour of the page backgrounds in the seventh opening. The left-hand page evokes a medieval schema with the dragon under the earth and the anthropomorphic tuberous plant. The text asserts that the teenage Merian has discovered that "the grown-ups are wrong about summer birds," and then the register shifts away from folk wisdom by referring to "insects" rather than "summer birds." The teenage Merian is said to have broken with the wisdom of her elders by her understanding that "insects are not born from mud." The stark change from darkness to light implies a sudden break in history, and the irony is that this sudden break is described as being caused by Merian's observation that "insects grow slowly, changing from one form to another." The story intimates sudden rupture and transformation into a new age, the story of an insect's lifecycle involves patient observation and slow transformation(s).

The use of white space in the right-hand page contrasts the black background of the left-hand page, but it also foregrounds Merian as a free-floating figure not grounded in the medieval mud of the previous page. The strategic use of white space, to foreground insects and vegetation too, is also a characteristic of Merian's artistic work. Merian's images often feature elements that are not to scale, in order to give them a more even representation within the arrangement of her imag-

es. There is the same lack of scale emphasised on the right-hand page, with the size of the flowers and the caterpillar being of too large a scale next to Merian's figure. Merian's own schema for illustrating the lifecycle of insects is thus evoked to give sense to a new age in which insects are not taken to be "evil."

The right-hand page has a staged and curated aspect: Merian's eyes are focused upwards, looking towards plants in her hands that are too large against the size of her body, and her arms are outstretched in an unnaturally open position. The curlicued plants at the sides of the image look more decorative than scientific. The medium for storytelling that is evoked is that of embroidery: Merian is positioned within an embroidered history, one that contains obvious differences in scale. This choice by the picture book-makers is perhaps logical given that Merian's first produced works were embroidery motifs, and Merian taught embroidery classes to groups of women in the early years of her marriage. According to Neri, Merian's work used visual strategies designed to facilitate its use as embroidery patterns.[49] One of these strategies is using scrolling stem patterns to separate and frame pictorial elements; the same strategy is seen in the seventh opening. Merian's *Blumenbuch* images could have been particularly appropriate as models for making slips, where designs were stitched onto linen canvas backing and then cut out.[50] The cut-out "slip" could be sewn onto another fabric, and the slip technique was a convenient way for rearranging elements of a composition before they were permanently attached.[51] The term "slip" derives from a gardening term describing a plant cutting.[52] In this opening, the image of Merian could function as a slip or cut-out model.

An anthropomorphic creature can be seen lying under the ground in the left-hand page, which evokes the sense of fear engendered by the old belief in insects as "evil" mentioned on the follow-

49 Neri, *The Insect and the Image*, 146.
50 Neri, *The Insect and the Image*, 146.
51 Neri, *The Insect and the Image*, 146.
52 Neri, *The Insect and the Image*, 146.

ing page. Merian herself appears to have been very careful not to have portrayed insects anthropomorphically. Her contemporary Goeddart sometimes let anthropomorphism creep into his depictions of insects, but Goeddart's overriding concern was a Christian allegorisation of the insect world rather than a concern with insects themselves being evil.

The metanarrative of *Summer Birds* implies that Merian's observation of the metamorphosis of caterpillars led to a sudden move away from the treatment of "insects as evil" and towards an understanding that nature was there to be scientifically investigated. However, this is rather a simplified embroidery of history, one that ignores the role of Merian's Calvinist theology in facilitating a move away from old Aristotelian frameworks of thinking that treated insects as being at the bottom of the *scala naturae* (ladder of nature).[53] A recuperation of Stoic thinking had already started undermining this framework of thinking, by conceiving of a divine energy at play within nature. Neostoics believed that nature was the result of God's creative spirit—*pneuma*—and that nature was uniform; there were no positions on a ladder.[54] However, Calvin goes further, asserting that:

> faith ought to penetrate more deeply, namely, having found him Creator of all, forthwith to conclude he is also everlasting Governor and Preserver—not only in that he drives the celestial frame as well as several parts by a universal motion, but also in that he sustains, nourishes, and cares for everything he has made, even to the last sparrow (cf. Matt 10:29).[55]

This perspective opened up the study of nature as a way in which these qualities of God could be revealed to the observer. The study of nature

53 Eric Jorink, "The Smallest Print in the Book of Nature: Crawly Creatures and Christian Devotion," in *Crawly Creatures: Depiction and Appreciation of Insects and other Critters in Art and Science,* ed. Hans Mulder, Jan de Hond, and Eric Jorink (Amsterdam: Rijksmuseum, 2022), 73.

54 Jorink, "Insects, Philosophy and the Microscope," 131–48.

55 John Calvin, *Institutes of the Christian Religion*, trans. Ford Lewis Battles (Philadelphia: Westminster Press), book 1, chapter 16, 197–98.

became recognised as one of two ways in which a believer could come to know God. In 1561, Guido de Brès composed the Belgic Confession,[56] a confession of faith approved by Calvin, which professed:

> We know him [God] by two means. First, by the creation, preservation, and government of the universe, since that universe is before our eyes like a beautiful book in which all creatures, great and small, are as letters to make us ponder the invisible things of God; his eternal power and his divinity, as the apostle Paul says in Romans 1:20 … Second, he makes himself known to us more openly by his holy and divine word.[57]

These two elements of God's revelation to humanity—his revelation within the "beautiful book" of nature, and his revelation within the divine word of the Bible, led to apparently confusing collections of ancient writings and natural artefacts within cabinets of curiosities in the sixteenth and the seventeenth centuries. The Protestant emphasis on accessing the Bible's text in the vernacular of the time meant that believers were now able to read for themselves about the events such as the locust plague, and locusts became a popular inclusion in cabinets of curiosities.[58] Personal observation was encouraged alongside interpretation of ancient texts, and the display of objects became a mark of piety, orderliness, and good taste within burgher households.[59] Merian's works were thus very fit for display in the living rooms of Calvinist households, an index of pious engagement with the natural world and of good taste.[60]

56 The Belgic Confession is still an active creed in contemporary Reformed Churches. For example, Christian Reformed Churches of Australia, "The Belgic Confession," available at https://crca.org.au/about-the-crca/beliefs/the-belgic-confession (accessed 19 October 2023).

57 Jorink, "Insects, Philosophy and the Microscope," 134.

58 Jorink, "The Smallest Print in the Book of Nature," 69.

59 Kinukawa, "Science and Whiteness," 91–116.

60 The coffee table books of Rien Poortvliet have served a similar purpose in pious Dutch households more recently. The *Ark van Noach: Or ere wie ere toekomt* (*Noah's Ark: or Credit where Credit is Due*, 1986) tells stories from Genesis,

Merian was content to let her pictures largely speak for themselves—to function as an invitation to meditation on the order of creation, with some descriptive language to pick out the details of the illustrations. In *Metamorphosis insectorum Surinamensium* and the Dutch translations of the *Raupen* books, the descriptions are short and there are no conclusions. Merian said that she had decided to record just what she had seen, as the "scholarly world" had heavily criticised her first two books.[61] Swammerdam and others wrote vigorously against the problems they saw inherent in theories of spontaneous generation. Swammerdam, in particular, opposed theories of spontaneous generation because they were atheistic—they relied on ideas of "pure chance" or "the blind forces of nature," rather than "a single cause" and "the unfathomable God and inimitable Maker."[62] Merian did not locate her work within these scholarly debates. Her work is important in its attention to visual detail and its concern to represent insects accurately without embedding them within the old emblematic or symbolic networks.

Conclusion

The metanarratives in these picture books hinge intensely on the idea of transformation. It is tempting to apply to Merian a metanarrative of personal transformation, given her concern to document processes of metamorphosis. However, the way this has been done in picture book format "cocoons" Merian's time within religious community, and cannot help but present Merian as a figure that needs to climb out of, or escape, the confines of religious thought. On the contrary, Merian's faith was a resource that helped her discard the old theories of spontaneous

highlighting God as creator of the natural world, and visually showcases Poortvliet's artistic process through his sketching of animals and their unique characteristics.

61 Hans Mulder, "Spontaneous Generation and Miraculous Transformations," 97.

62 Eric Jorink, "From Symbolism to Intelligent Design: The World as Clockwork," in *Crawly Creatures: Depiction and Appreciation of Insects and other Critters in Art and Science*, 93–102, ed. Hans Mulder, Jan de Hond, and Eric Jorink (Amsterdam: Rijksmuseum, 2022), 82.

generation at the beginning of her career as producer of publications on insects. Her faith also motivated her to make visual representations that honoured God as creator of intricate and wonderful creatures, that were not any less intricate or wonderful in their creation than humans and other creatures formerly at the top of the Aristotelian ladder.

A metanarrative that presents Merian as a teacher and one who passed on her unique "curiosity" to young and emerging scientists is also a tempting story to tell a young audience. Contemporary science does "trade" in an idea of curious and anticipatory engagement with the natural world, an engagement that, it is hoped, will draw young people into a STEM world of research. Educators gloss curiosity as an important virtue and plan lessons designed to provoke a curious interest in the wonders of the natural world. However, this metanarrative does capture the trading and colonial interests that Merian was embedded within, and her status as a Protestant businesswoman in this world. Her entrepreneurial drive and her "success" are bound up with the commodification of the natural world. The Calvinist context in which Merian operated helps us to understand the virtues ascribed to her business sense, and at the same time it helps us understand the colonial urges entangled with that curiosity.

A metanarrative that presents Merian as a transformer of history fails to position her within religious and scientific thought that had already moved away from the idea of insects as "evil," and that was debating the theological validity of spontaneous generation. A more Calvinist metanarrative, perhaps, would highlight Merian's work ethic over her lifetime, and her commitment to representing the intricate wonders within God's "Book of Nature." Merian's representations of the insect world did not vary in style throughout her lifetime, and the representation of the lifecycle of an insect within its ecosystem is her important contribution to science and its ordering of information about the natural world. Merian was diligent, painstaking, and hardworking, applying the same material processes of production and the same means of observation, over and over. It was this doggedness of purpose and attention to detail that resulted in her work on insect ecosystems,

which amounts to a gift to the scientific community of the early modern age. Contemporary picture book-makers accept this gift without understanding that Merian's religious faith is inextricably bound to it. They also do not see the role of religion in shaping and fostering, not inhibiting, the development of early modern scientific observation.

The author reports there are no competing interests to declare.
Received: 10/10/23 Accepted: 06/12/23 Published: 19/12/23

Book Reviews

Stavros Lazaris: *Le Physiologus grec, vol. 1: La réécriture de l'histoire naturelle antique*

Firenze: Sismel Edizioni del Galluzzo, 2016; 178 pages
ISBN-13: 9788884507389

Little do we know about the earliest Christian book of science, *Physiologus* ("natural philosopher"), the main object of Stavros Lazaris' (the French National Centre for Scientific Research) interest over the years. The book reviewed here, the first volume of the trilogy *Le Physiologus grec* ("the Greek *Physiologus*"), has already been followed by a second volume (2021) analysing the illustrations that accompany the description of animals, plants, and minerals in this ancient work. The project will include a third study, on the posterity of *Physiologus* in the Renaissance and in modernity. Lazaris has also edited *A Companion to Byzantine Science* (2020).

The volume under consideration has two main parts. The first part discusses the origins of *Physiologus* and its manuscript traditions. Lazaris reviews the scholarly hypotheses regarding the authorship of this otherwise anonymous work (pp. 9–16) and its dating, with the author advocating a very early recension, in the first half of the second century (pp. 17–30, 144), and Alexandria as the place of its composition (pp. 31–36). While, here, I am not much interested in such technicalities, I voice my agreement on the proposed time and place. I have personally found allusions to *Physiologus* in Clement of Alexandria's *Exhortation*, written in the second half of the same second century, which confirm Lazaris' views. Accordingly, I must raise an eyebrow at the consensus, which Lazaris repeats (pp. 14–15), that there are no traces of *Physiologus* in Clement—especially given that eventually Lazaris returns to the matter by acknowledging Clement as inaugurating the approach at the heart of *Physiologus*' method (p. 143). Of lesser interest,

here, is the discussion of recensions and editions (pp. 47–78), which undoubtedly causes delight to philologists and others.

Fascinating is Lazaris' enquiry about the sources of *Physiologus*, classical and scriptural alike (pp. 37–46), with the schema of direct and indirect sources at page 44 providing extremely useful information. When considering this schema—which includes twenty classical sources and innumerable scriptural references—one quickly realises that this early Christian work perfectly exemplifies an integrated discourse, where faith and the available sciences creatively intersect. It is upon concluding this section that Lazaris gives the reader a sense of *Physiologus*' approach. Specifically, in describing animals, plants, and minerals scientifically, by the standards of the time, together with offering ethical interpretations of the items, the work does not cultivate theory for the sake of theorising or knowledge as an end of all scientific enquiry; it is in order "to propose an exhortation for virtue and Christian edification" (p. 46). By the way, Clement also used animal types to indicate human characters and behaviours (see *Exhortation* 1.4.1).

The second part of the monograph deals with *Physiologus* as an illustration of how science can serve the goals of Christian faith (pp. 78–141). Here, Lazaris examines the ways the anonymous author(s) and editor(s) pushed the envelope of a Christian view of the available sciences, with faith, we read, confirming the validity of and reinterpreting scientific knowledge (pp. 101–109). The rest of the book considers *Physiologus*' aims and reception (pp. 111–141).

Of particular interest is the section "The Content and the Structure of the Chapters" (pp. 81–99). There we learn that the main manuscript of *Physiologus* includes forty-eight chapters (other manuscript traditions giving either less or more sections), with animals featuring prominently whereas plants and minerals receive much less attention (two and six chapters, respectively). Of the animal kingdom, preference is given to terrestrial wild things, domestic animals being totally ignored, while crawling things and aquatic lifeforms are discussed sporadically (p. 83).

Lazaris shows that the author(s) of *Physiologus* treat(s) the items according to the accepted scientific standards of the time, describ-

ing their nature (*physis*) in detail. That some listed animals, like the phoenix or the siren, were imaginary was not known to the author(s), who assessed all by the same method. Accordingly, Lazaris refuses the anachronistic taxonomy of scholars, who classify the items as either real or fantastic (p. 82). In so doing, he brings the reader closer to the universe of the ancient author(s), whose world was as fascinating as that of the occasionally unbelievable lifeforms contemporary scientists discover in oceans, caves, and jungles. And, Lazaris notes, the more fantastic, the better these beings served the ethical purposes of the work. But this is not to say that *Physiologus* treats the various animals differently. They are all considered in the same manner, through relevant scriptural references, the available natural description, and by highlighting their moral significance (p. 85). Said otherwise, *Physiologus* establishes links between animal features and human attitudes. One would contemplate the nature of certain animals in order to learn something more than what they are and how they live—namely, what they teach us about ourselves (pp. 83–84). This, to me, is a way of saying that, for the ancient Christian author(s), the natural continuum between animals and people was as much a given as the common behavioural traits between them. And so, within *Physiologus*, while the Scriptures interpret life, the sciences analyse it.

This is a very interesting approach, especially for educated Christians, including scientists and students of science, and Lazaris is correct to characterise *Physiologus* as an early Christian "handbook for initiation in the Christian faith, a catechetical project whose goal was to communicate to its readers Christian ethics and the fundamentals of the new religion" (p. 144). While contemporary educators do not have to turn to the natural sciences of *Physiologus* in order to illustrate ethical principles for Christian students, the lessons of this ancient book can inspire them to follow a similar method when they discuss what we know about life, nature, and the cosmos.

While Lazaris' take on *Physiologus* appears to have stirred a flurry of reactions among scholars (see the many references to his book in the edited collection of *The Multilingual Physiologus*, 2021), his contri-

bution is of great relevance to educated Christians who cultivate wonder for God's creation and seek to contemplate it through their own, Christian that is, eyes. A translation into English of his work would be extremely useful.

Doru Costache
ISCAST and the Sydney College of Divinity
January 2023

D. Gareth Jones: *At the Margins: A Life in Biomedical Science, Faith, and Ethical Dilemmas*

Eugene, Oregon: Resource Publications, 2022; 193 pages
ISBN-13: 9781666744712

This book is Jones' personal reflection, as a scientist and committed Christian, on a number of bioethical issues he has been involved with over the years. This includes the ethics of procuring and studying deceased bodies, the COVID pandemic, the ethics of cystic fibrosis, IVF and the study of fertilised human eggs, same-sex attraction, and living as a Christian in a secular world.

As professor of anatomy at Otago University, Jones faced the challenge of obtaining anatomical specimens ethically. In the process, he was able to strengthen the procedure of ensuring informed consent before bodies were used. This then meant that bodies from the indigent or those who had no kin were no longer available to anatomists. He also raised the dilemma of using highly detailed drawings taken from political prisoners during the Nazi era by Professor Pernkopf, a committed ideologue of the regime. Jones also examined the ethics of plastination—preserving bodies in a very life-like manner for public display (e.g., BodyWorlds, https://bodyworlds.com/) and the role of profit-making in these anatomical displays.

When discussing the scientific response to the Covid-19 pandemic, I agree with Jones' contention that we need to accept the conclusions of science, but I do not see that as in contrast to the directives of politicians. The results of scientific work during the pandemic, as Jones argues, are immense; the development, testing, and rapid implementation of vaccines is an enormous success story, which should be widely celebrated. However, to say that we should follow scientists rather than politicians is somewhat naïve, for there are a number of different opinions between scientists, particularly in the area of public health policy. For instance, opinions on who should be locked down, for how long and at what cost? These considerations have severe economic and business implications. They require society to come together and for all the points of view to be evaluated. That is why we have government leaders, politicians, and bureaucrats, who in an ideal world would dispassionately consider the broader dimensions of public-health policy. The government has the authority and responsibility to implement those policies and take responsibility for the consequences of their decisions, and we hold them to account at the ballot box. Unfortunately, the word "politician" is ambiguous and is often used to describe those tainted by vested interests.

Jones writes in the book of his personal experience of being a grandfather of a child with cystic fibrosis. He discusses the difficult ethical decisions confronting a couple as they consider having further children and the issue of procuring and paying for expensive new treatments for this disease. This is heightened by the fact that medical resources are mal-distributed around the world. We in the West have much better access to the latest and most expensive treatments. It is an honest and moving chapter, showing how different couples handle these issues differently, depending on their ethical stance.

One area where Jones has done much reflection is in the belief in the sanctity of human life from the moment of conception. This has become a sacrosanct position among conservative theologians and ethicists, even though, as Jones has extensively written, its biblical foundation is just not there. Nor could it be, for there is no way that an ancient text can be expected to discuss the nature of human blastocysts and embryos in

https://doi.org/10.58913/BKNQ3951

the sort of detail known by modern science. Nevertheless, Jones is not cavalier about blastocysts and embryos; his position is far more respectful and nuanced than that.

Jones devotes a chapter to his choice to develop a bioethics centre in a secular environment in Otago. The decision to position this centre in a secular environment might be surprising for a committed Christian, but Jones felt that a secular centre would provide a greater intellectual freedom and influence than one with a Christian foundation. That is an interesting comment on the state of Christian bioethical reflection and on Christian intellectual pursuits generally. Isn't it odd that there is greater intellectual freedom in a secular environment rather than in a Christian one? What does that say about the state of Christian debate generally?

Further, Jones believes that he, as a Christian ethicist, has a role to play in the secular world and that the secular world can teach him. This is refreshing to see because there are some thinkers (including those as eminent as Alasdair MacIntyre in his *After Virtue*) who believe that those of faith may need to withdraw from the world into their own believing community. Jones represents a refreshing counter to such belief.

Such commitment to a secular society is further highlighted by Jones' role on government bioethics committees. As a result, he seeks to find common ethical ground with those from other persuasions, but, in doing so, he alienates himself from doctrinaire Christian thinkers who believe they are right and that the secular world must either adopt the Christian worldview or be dismissed. They would see Jones' position as a sell-out of their Christian position.

Jones helpfully distinguishes between an idealist as opposed to a realist perspective. He claims not to be a theological expert in this area, but such a position has been helpfully explored by Helmut Thielicke who struggled with the ethics of being a pastor in Nazi and post-war Germany. Thielicke helpfully explored ethics as a choice between two unacceptable options. This realism is at odds with those ethicists who choose absolute positions—such as the position that the fertilised human egg is fully human from the moment of conception, a position

https://doi.org/10.58913/BKNQ3951

which is problematic for those contemplating, for example, IVF or prenatal genetic diagnosis in cystic fibrosis.

Jones' stories related in this book remind us that Christians are often marginalised. "They will put you out of the synagogue," Jesus said, (John 16:1-2). "Blessed are you when you are persecuted for righteousness' sake … for in the same way they persecuted the prophets of old" (Matt 5:10a, 12b). The writer to the Hebrews invites his followers to go outside the camp (Heb 13:13), for Jesus was crucified outside the city and bore disgrace there. So, marginalisation seems to be the lot of Christ's disciples. But whose margins? Clearly at the time the New Testament was written, Jewish Christians were being marginalised from the synagogues, as Jesus predicted (John 16:2). Jones suffered marginalisation from the Christian right who misunderstood his commitment to truth in relation to in vitro fertilisation, seeing his position as a sell-out of evangelical faith, but there are other marginalisations that can occur. The current Anglican Archbishop of Canterbury is being marginalised by a group of evangelical bishops who believe that the next Lambeth conference is not committed to truth as they see it. Evangelical ministers in Episcopalian churches in the US and Canada have been marginalised from liberal dioceses for their perceived fundamentalism. Gay people are being marginalised from mainstream society, and straight people are being marginalised from queer communities.

On what basis marginalisation? As far as Jesus is concerned his followers should be committed to truth and righteousness, and that will bring its own marginalisation. This still raises the questions of what is truth and what is righteousness. Dealing with those questions is where differences and marginalisations can occur. Jones' concern is for straightforwardness and honesty, and he feels this has been costly for him, in both church and university, where he has encountered "half-truths and dubious dealings." In spite of this he has not withdrawn but seeks to stay in the marketplace of ideas and be salt and light in the world, but not of the world. No wonder he is my go-to bioethicist.

Alan Gijsbers
February 2023

Paul Tyson: *Seven Brief Lessons on Magic*

Eugene, OR: Wipf and Stock, 2019; xii + 76 pages
ISBN-13: 9781532690419

This brief book changed how I see today's world—a pretty big claim, especially for someone who has been engaged in theological education for fifty years. But Paul Tyson's elegant analysis of how "magic"—"the real qualities and mysteries of the world that science just can't grasp"—opened my eyes to how far prevailing views of life assume that *natura pura* is the only reality.

It is important to state that Tyson strongly affirms that the sciences explore what is real. What he opposes is the "anti-magical" assumption that only nature/materiality is real, and that all else is internal feelings or constructions. This position, widely espoused in the media, eliminates foundations for what matters for daily life—love, justice, beauty, goodness, and the like.

Tyson, who teaches at the University of Queensland, Australia, introduces his "lessons" in the first two chapters, identifying four "theories" of magic: two largely past (animistic and Platonic) and two strongly current ("supernatural," over and against nature; and "anti-magical"). It took me a while to grasp the full implications of this analysis, despite a helpful diagram on page 17, but, as the book went on, its significance became (alarmingly) clearer.

The third and fourth "lessons" take up the commonly espoused thesis that the modern world has become "disenchanted." In some ways, Tyson accepts this—but in reality it "did not happen," citing the example that, after all, Harry Potter books have broken publishing records. Tyson finds Kierkegaard's "inversion" of Locke and Hume helpful, bringing relationships rather than ideas to the fore, and the significance of using imagination beyond "bare reason."

These lessons lead into what I found to be the core of the book: Lesson Five on "The Magic of Quality and Purpose." Tyson excoriates *both* "supernatural" *and* "anti-magical" ideas: one example that stood

out was showing that both Marxism ("anti-magical") and "Christianity as promoted by the US during the Cold War" ("supernatural") "had a functionally materialist, 'realist' outlook on power, and both lacked any practical qualitative metaphysics" (p. 48).

Tyson's concern is thus not narrowly with the sciences, but "understandings of knowledge, value and power" in today's Western world (p. 61). False assumptions about the reality of "magic," commonly perceived to be due to the influence of "science," distort and harm what actually matters about life, the universe, and everything.

The final two chapters set out Tyson's response, initially by arguing for "the magic of essence," and then the recovery of a Platonist outlook, vividly illustrated by how Augustine saw the civilisation of ancient Rome. I would gladly read more on the latter—Ricoeur and Girard are noted as offering "interesting ideas" (just interesting!). And then comes this tantalising comment (p. 65): "Animism without empire—such as we had in ancient Australia—develops a kind of dynamic stasis, a deeply adaptive harmony between the beauty and ugliness of nature and a way of life defined by deep listening, deep responsiveness, and genuine sustainable harmony with the fragile and merciless nature of the ancient and environmentally delicate southern continent. But we are all a people of empires now …"

More please! This brief book reshaped how I live as a human being today and stirred me to appreciate the reality of what truly matters. I have no hesitation in recommending it.

Charles Sherlock
Ridley College; Trinity College; University of Divinity
February 2023

https://doi.org/10.58913/XJRY8997

Marc A. Pugliese and John Becker (eds.): *Process Thought and Roman Catholicism: Challenges and Promises*

Lanham, MD: Lexington Press, 2022; 237 pages
ISBN-13: 9781793627780

The nineteenth century witnessed a growing dissatisfaction with the received philosophical and theological tradition on the divine nature as omnipotent, omniscient, unchanging, and all-loving. Foremost among them was Georg Hegel (1770–1831), whose dialectic of the spirit envisaged God as a dialectic of the finite and infinite, in a process of self-realisation. However, the person considered the father of modern process thought is Alfred North Whitehead (1861–1947), a mathematician who, like his mathematical collaborator, Bertrand Russell (1872–1970), turned increasingly to philosophical questions. Dissatisfied with what was viewed as a traditional "static" substance-based metaphysics, Whitehead sought to build up a metaphysical system wherein process, relationship, and event become central categories for all being, including the divine being. His favoured title for this metaphysical system was "philosophy of organism" but eventually the term "process philosophy" became more popular for his system.

Process thought has not received a significant uptake among Catholic theologians, which is the focus of this book. Apart from Thomists and perhaps Lonerganians (such as myself), most Catholic theologians have preferred more personalistic or hermeneutical philosophical approaches to the various metaphysical systems on offer. Whitehead's philosophy has however found advocates largely among liberal Protestant philosophers/theologians such as Charles Hartshorne, John Cobb, David Ray Griffin, and Marjorie Hewitt Suchocki, and among those interested in the relationship between science and religion, such as Ian Barbour, Philip Clayton, and Arthur Peacocke. Cobb and Griffin, in particular, did much to make Whitehead's stance more accessible in their book, *Process Theology: An Introductory Exposition*

(Philadelphia: Westminster Press, 1976). Whitehead sought to develop a metaphysical system that would replace the generally Thomistic language of substance, accident, causation, and existence, with a more "dynamic" set of categories such as event, relationship, and process. This approach led to a very different conception of divine being—one which existed in mutual relationship with the world—such that "It is as true to say that God creates the World, as that the World creates God." It is difficult to reconcile such a statement with traditional Christian beliefs such as creation *ex nihilo* (from nothing).

This present collection of essays provides various levels of engagement with and extensions of Whitehead's approach, touching on a variety of theological questions of interest. Many of the essays provide convenient introductions to aspects of Whitehead's thought and terminology, which is notoriously complex and not always consistent. This helps readers navigate their way, piecing together insights into the totality of the system.

The book has a longish introduction by John Cobb Jr. on his own encounter with process thought as well as notes of appreciation of and engagement with each of the contributions to the volume. While not as tightly written as the major essays, it provides a more personal account and response to the other authors. Cobb was an early adopter of process thought and continues to be a strong defender.

The first two substantive essays, by David Burrell and J. J. Mueller, reproduce articles that have appeared in *Theological Studies*, which raise significant objections to Whitehead's project. Burrell's piece is a standard reference point for many Catholic theologians seeking a critique of process thought. Its appearance in *Theological Studies* generated some significant response from Joseph Bracken and Elizabeth Johnson. Burrell argues that process thought was built on a straw opponent labelled "classical theism" which bore little resemblance to the achievements of Aquinas. Mueller explains why process thought has found so little pick up among Catholic theologians, while finding a home among some liberal Protestants.

Ilia Delio, a Franciscan nun, suggests links between the thought of medieval Franciscan thinker Duns Scotus and that of Whitehead. Scotus has a mixed reputation and there are a number of scholars seeming to rehabilitate it. For the general reader with little knowledge of Scotus' thought, this is likely to be of little interest. While there are some points of contact between Scotus and Whitehead, some of the connections seemed a bit forced. The context of both thinkers was very different, and there is no evidence that Whitehead was aware of Scotus' work.

Daniel Dombrowski examines the contribution of Charles Hartshorne, who did more than anyone to bring Whitehead's ideas to a larger audience, and Hartshorne's relation to Catholic thought. This chapter introduces the term "dipolar" in relation to God, not to be confused with the contemporary psychological meaning of the term. A process account posits a primeval nature of God to which many of the classical divine attributes, suitably reinterpreted, can be located and a consequent nature which is constantly changed by creation itself. Such a conception of God views God as changing as creation changes, in a relationship of mutual dependence. This is argued as a superior position to the more traditional "monopolar" notion of an unchanging timeless God. Dombrowski also discusses how process thought handles the problem of evil, a major issue in any metaphysical account of God.

Maria-Teresa Teixeira likewise identifies similarities and tensions between Whitehead's thought and key Catholic positions. Here we encounter Whitehead's focus on creativity and freedom which extends to all "actual entities." Teixeira is not afraid to raise the spectre of heresy in noting the divergences of Whitehead's position on creation from traditional Christian teaching but still strives to harmonise his position with that teaching where she can. Among all the contributions, she identifies Whitehead's position on "objective immortality" as opposed to continued personal subjective immortality as posing a major break with traditional belief.

Joseph Bracken, perhaps the more prominent Catholic thinker to have engaged with Whitehead, suggests a more "systems-oriented" metaphysics to balance permanence and change, drawing on lesser

utilised elements in Whitehead's thought. Bracken proposes a model of "system" to provide a bottom-up account of causality as an expansion of Whitehead's account as a way to overcome identified weaknesses both in Whitehead and more traditional approaches. He calls this approach a "systems-oriented panentheism." Bracken includes speculation on the Trinity as part of this, which, while better than the abortive attempt of Cobb and Griffin, still falls short of traditional beliefs on the Trinity. It is more a philosophical construct than a theological faith seeking understanding.

Thomas Hosinski proposes a process interpretation of *creatio ex nihilo* that would bring it closer to more traditional Christian belief on the issue of creation. The virtue of this contribution is that it directly addresses a key issue, the absence of any sense of *creation ex nihilo* in Whitehead's understanding of the God-world relationship, with flow-on issues such as the problem of evil, divine governance, and providence. Hosinski's analysis makes it clear that Whitehead's God has a temporal existence, as evident in his discussion of God's "foreknowledge," leading to claims that the classical account of God "predetermines" reality, placing God "in control." All these assertions are in fact a misunderstanding of the more classical account, but they highlight the fact that such misunderstandings are, in fact, common and present real difficulties for many believers. Hosinski seeks to restore some sense of *creation ex nihilo* in Whitehead's system, which may convince those wedded to it.

Palmyre Oomen considers ways in which process thought might assist in understanding the Incarnation through the notion of co-inherence. Similar to Bracken's attempt to present a process account of the Trinity, Oomen seeks to present a process-oriented account of the Incarnation through a consideration of Platonic influence on the early Church Fathers. The chapter comes up against some of Whitehead's own limited understanding of Christian belief, for example, that the belief in the Holy Spirit is a doctrine of divine immanence in the world. Given his philosophical approach, Whitehead tends to read the doctrine of the Trinity along the lines of the philosophical problem of

transcendence-immanence, rather than a scripturally based account of divine missions. Oomen suggests the notion of mutual indwelling or co-inherence (*perichoresis*) as a way of describing the process account of the God–world relationship.

The following four essays have a tighter, more limited, focus in particular issues in Catholic theology. Thomas Schärtl suggests the use of a process metaphysics for understanding sacramentality and the Eucharist. Again, Whitehead's noting of divine immanence plays a key role. Given Whitehead's rejection of the metaphysic of substance, Schärtl proposes various alternative ways in which the eucharistic present can be explained. John Becker, one of the editors, engages with the topic of religious pluralism from a process perspective. Here, a number of process-oriented authors, most notably Cobb, but also Griffin and Bracken, have made contributions and Becker provides an account of some of these. Marc Pugliese, the other editor, enters into the debate about the possibility of intrinsically evil acts, comparing the position of Aquinas and Whitehead. This is of interest to Catholic moral theologians where the category of intrinsic evil has found its way into Catholic papal teaching. A final essay by Leo Lefebure brings process thought into dialogue with ecological issues, including Pope Francis' encyclical *Laudato Si'*. Here, Whitehead's more "organic" approach is said to be more congenial to ecological concerns. There is a brief afterword by well-known Catholic theologian, Thomas Rausch, offering some autobiographical notes on his own encounter with process ideas.

One issue I felt was not seriously engaged with is the repeated assertion that God is temporal—an inevitable consequence of Whitehead's understanding of the God-world relationship. Such a claim appears to violate Einstein's account of the relativity of time. If God's existence is in some sense "temporal" we are entitled to ask, "Which time frame does God's time correspond with?" Whitehead was aware of this difficulty and attempted to address it by reinterpreting Einstein's theories of both special and general relativity. His interpretation of special relativity was mathematically the same as Einstein's, but more phenomenologically oriented, drawing on our "experience" of temporal

duration and simultaneity. He specifically attempted to restore some notion of simultaneity which Einstein's theory rules out. However, his work of a theory of gravitation differed significantly from that of Einstein's general relativity and makes different predictions. The equations of Whitehead's account of gravity are linear while Einstein's are distinctly non-linear. Given the continued success of general relativity to stand up to empirical verification, Whitehead's attempt here has not been successful. This remains an unaddressed issue in this book.

This book is a good place to start for anyone interested in a serious engagement with process thought. A number of the authors spell out basic aspects of the process vision, helping to unpack the dense and difficult ideas found in Whitehead's writings. The editors have done well to begin with two relatively critical pieces, so as not to turn the work into a one-sided affair.

Neil Ormerod
Alphacrucis University College;
Australian Centre for Christianity and Culture
April 2023

Peter Harrison and John Milbank (eds.): *After Science and Religion: Fresh Perspectives from Philosophy and Theology*

Australia: Cambridge University Press, 2022; 330 pages
ISBN-13: 9781316517925

Co-editor, Peter Harrison, is an Australian Laureate Fellow and Director of the Institute for Advanced Studies in the Humanities at the University of Queensland. He was the Idreos Professor of Science and Religion at the University of Oxford. He is an ISCAST fellow. He has published extensively in the field of relations between science and religion. The most recent of his six books is *The Territories of Science and*

Religion. Many of the contributors to *After Science and Religion* develop themes from *The Territories of Science and Religion*.

Co-editor, John Milbank, is Emeritus Professor in the Department of Theology and Religious Studies at the University of Nottingham, where he is President of the Centre of Theology and Philosophy. Milbank founded the radical orthodoxy movement. His work crosses disciplinary boundaries, integrating subjects such as systematic theology, social theory, ethics, aesthetics, philosophy, political theory, and political theology. Milbank delivered the Stanton Lectures at Cambridge in 2011.

This book builds on Harrison's *Territories of Science and Religion* with contributions from thirteen leading historians, theologians, scientists, and philosophers.

It is very difficult to summarise this book without risking misrepresenting it. Perhaps it is best to summarise it in the words of its contributors. John Milbank states "The aim of the new 'After Science and Religion' project is to call into question an entire existing intellectual discourse and to try to forge a new one in its place. … The existing discourse tends to assume that there have more or less always, or for a very long time, existed discrete realms called 'science' and 'religion'" (p. 102).

The late Tom McLeish states, "The commonly accepted historical narrative that 'science and religion' inhabit a context of 'conflict' or 'warfare' is deeply flawed. … But in the late modern era, questions surrounding science and theology have been largely confined to the field of apologetics, with various degrees of warmth attributed to different possible constructed relationships between the two categories (or alternative epistemologies)" (p. 324).

McLeish proposes the "direct test of this set of narratives would be to put twenty-first century scientists into direct contact with the natural philosophy of the thirteenth" (p. 327). Many of the contributors note that Harrison called into question that the terms science and religion as commonly accepted contribute to an "illicit reification" of the terms. That is, they are falsely considered historically fixed things that are clearly classified. The reality is complex and fluid. Though, as

Harrison admits, the complexity thesis has not gained traction and has little to commend itself other than being true.

Many of the contributors trace the sometimes-strange historical antecedents of the terms "science" and "religion" more broadly and further back in time than Harrison's *Territories*. These antecedents inhabit a context of "conflict" or "warfare" that is deeply flawed. Lightman examines dead ends in nineteenth-century theology. Milbank examines the contribution of hermetic or magical thinking in the high Middle Ages. Pickstock examines the influence of some fourteenth and fifteenth-century scholars on the development of later science-like thinking. Her description of Lady Ann Conway who later influenced Leibniz is quite informative. McLeish compares contemporary narratives of science against the natural philosophy of the thirteenth century with interesting results.

The breadth of the contributions is significant. Even experts in this field will be stretched with new concepts, people, and ideas. This book will challenge and stretch all readers in a good way. Nevertheless, David Bentley Hart and John Milbank need to be read with a good dictionary at hand. As well as being worth reading as usual, they are as challenging to read as they are profound.

The book points to possible ways forward in the interaction between science and religion. The contributors do not claim to have found a way. Instead, we are challenged to think about why we do what we do. For those at the science–theology interface, this is a good challenge to think about.

There are at least two dangers we are challenged to avoid. The first is the trap of thinking that the categories of science and religion are what "everyone" thinks, and becoming bound in our thinking by what we presume those categories are.

Schindler and a couple of other contributors point to the second problem outlined by Stephen Gaukroger in his *Civilization and the Culture of Science: Science and the Shaping of Modernity*: that there is a tendency from its "earliest beginnings in the thirteenth century of what would become 'modern science' for the enquiry into the natural world

to present itself not just as 'one cognitive discipline among many' but as 'the key to cognitive inquiry generally,' and that that tendency became genuinely totalitarian already in the first properly modern pioneers of science" (p. 293).

This totalitarian dominance of "scientific reasoning" for everyone is highlighted by Williams, Hart, Hanby, Milbank, and Harrison. Perhaps the difficulty in finding a way forward is best demonstrated in Milbank's otherwise excellent chapter. Milbank argues that medieval traditions of magical reasoning influenced the later development of what would become science. Milbank's own argument is dominated by scientific reasoning. At one point he incorrectly reasons that the "established" scientific law, that the speed of light is a fixed barrier, means that quantum entanglement contracts science and is somehow magic.

This is an excellent book. It is an advanced text and so not necessarily for those new to the interaction between science and religion. It is an important text for all of us who have a serious interest in the field and are concerned with how we move into the future.

Robert Brennan
Wontulp-Bi-Buya College
May 2023

Robert Wiles: *The Mind in the Matrix: What the Complexity of the Universe Tells Us About Meaning*

Cooma, NSW: Information Press, 2019; 152 pages
ISBN-13: 9870987562227

"Information" is the key to this most *interesting* book, whatever other issues arise. Robert Wiles argues throughout that much scientific and philosophical work does not take adequate account of *information* as foundational to material existence, especially human. He makes a very

strong case for the significance of the "Infosphere," which shifted my thinking—not something that happens very often!

The author's motivation, however—hinted at in the Foreword by Professor Charles Massey, set out a little more in the Prologue, and disclosed fully in the concluding chapter—is to support an argument for the existence of the "Creator God." My problem with this new form of the "argument from design" is akin to my difficulties with Aquinas, Descartes, and others who have walked similar paths. On the one hand, poor design is not confronted; and on the other, the deity so deduced all too easily becomes our servant. Given the book's distinctive emphasis on information, I found it hard to recognise its argument leading to faith in the God revealed in the Word made flesh. The conclusion feels imposed rather than evoked.

Having got that off my chest, let me warmly commend the core of this book, chapters two to six. I am a life-long theologian, perhaps too sensitive to the problems with arguments "from below." But such a calling means being interested in the way all branches of learning inform the human condition. There is much in these chapters of both great interest and significant value.

Chapter Two explores the distinctive place of information in mathematics, physics, and cosmology, and the four forces of the Standard Model's explanation of the fundamental structure of matter. In the process, Wiles argues for an "Information insertion" model to undergird current reliance on the Big Bang concept, which he sees as lacking the prior information needed for its existence.

Chapter Three pays close attention to the constants needed for the universe to exist. Of particular interest is a diagram (p. 52) of the "Tangible Domain," mapping the space-time fabric of the universe with a focus on the information streams involved.

Chapter Four turns from the macro to the micro levels of existence: life and DNA. A convincing argument is made for the need for information prior to the first living cell. The author affirms micro-evolution (i.e., within the same species) but questions evolution more widely understood.

Chapters Five and Six consider consciousness and mind, setting "man" within the range of all living things. The "Tangible Domain" diagram adds "Cyberspace," on the physical/digital side of the "Space-Time fabric," and "Mindspace" on the human self-awareness side.

Chapter Seven, the concluding chapter, draws together the previous chapters, completing the "Domains" diagram with the "Quantum Domain" and the "Information Fabric" that is timeless (p. 120). The following quotation (p. 111) exemplifies the author's overall perspective: "Thus information, even though it is often not easily identifiable, is the entity from which everything else is made. However, our universe lacks an internal mechanism to generate this information. Therefore, the information must have originated from somewhere outside our physical Cosmos, a separate domain from whence the *information* to specify all energy/matter was imported. As the source of everything in the Universe, this information must have preceded the formation of the Universe."

The chapter goes on to argue against explanations (including, surprisingly, "Intelligent Design") of "Information injection" other than God. The negative arguments are well done but how this alternative is argued leaves a lot to be desired. The writing in the last half-dozen pages is less than careful. For example, does the above quotation deny *ex nihilo*, or imply that the universe is an extension of the divine? And Appendix 1, encouraging the reader to see themselves and their potential as the centre of what matters, is a worry.

A further concern is the author's frequent citation of well-known scientists who identify as other than Christian, with quotations that seem to support his case—Richard Dawkins, Stephen Hawking, Paul Davies, for example. None are misquoted, and all are documented in endnotes and indexed fully, but—and I may be wrong—I became uneasy at the way they seem to be "used."

I would love this significant book to go through a revised edition, in which the author— unafraid to acknowledge his Christian worldview—presents the importance of taking the "Infosphere" with full seriousness, and leaves "argument from design" alone. This is what the

present book's subtitle promises, with its focus on meaning. The "Domains" diagram shaped over the second half of the book is very helpful in seeing the universe more wholistically, for example, as are analyses of aspects of the Neo-Darwinian synthesis, "Multi-Universe" and other contemporary ideas, and more besides.

Such a book would not only inform Christian and other believers, but invite others to start to see, in their own way, the hints all around that "life, the universe and everything" are creatures. The way of grace evokes rather than imposes truth.

Charles Sherlock
Ridley College; Trinity College; University of Divinity
July 2023

Paul Tyson: *Theology and Climate Change*

London: Routledge, 2021; 140 pages
ISBN-13: 9780367565367

Any prospective purchaser of this book should be informed at the outset that while the terms theology and climate change appear in the title, the term theology is not used in its usual sense, and they will read little about the scientific aspects of climate change which are taken as given. When Paul Tyson speaks of theology he distinguishes between "theology A" and "theology B." The first is metaphysics or first philosophy (following Aristotle), while the second relates to a disciplined reflection on religious sources, texts, and traditions, taken as normative for a religious community. His focus is on theology A. When it comes to climate change, Tyson is not concerned (directly) with CO_2 emissions, but with the "theology A" assumptions which he finds as the cultural driver of climate issues.

When it comes to giving an analysis of long-term historical issues authors move in one of two directions: the idealist which sees

"ideas" or culture as the predominant driver; and the materialist (e.g., Karl Marx) who views it as economics and perhaps technological and political power that drives culture. As Charles Taylor points out in *A Secular Age*, the truth is often a mix of the two: "The only general rule in history is that there is no general rule identifying one order of motivation as always the driving force." The present work falls within the idealist camp and identifies what Tyson calls Progressive Dominion Theology (PDT) as the "primary cause of climate change" (p. 71). PDT "values domination, it values instrumental and calculative reason that solves problems, it values nature as a resource" (p. 124). Tyson argues that this "theology" is common among both religious and non-religious persons of various political commitments and largely shapes our modern attitudes to the environment. In this sense Tyson's work is a longer and perhaps more nuanced exposition of the position of Lynn White: that Western Christianity is the cause of our ecological crisis.

What the reader of this work will get, and is of value, is a course in the history of ideas which led to the development of PDT, notably through various positions (nominalism, atomism, voluntarism), which coalesced to form PDT. There are various types of genealogical accounts of the origins of modernity—from Charles Taylor, John Milbank, or Alasdair MacIntyre to name a few—and Tyson draws on various authors to develop his case. However, this current work remains a largely idealistic account of cultural change, with the technological, economic, and political forces at work only really coming into play in the final chapters. To work out how much the cultural aspects drove the technological, economic, and political, and vice versa, would require a much more fulsome and nuanced account. Still, for a reader unfamiliar with the relevant cultural history, Tyson provides a good education.

When it comes to theology B, Tyson is clearly more at home in evangelical circles. His account of Catholic ecological theology is minimal, largely based on Pope Francis' encyclical *Laudato Si'*. It is clear that it is white evangelicals (Evangelicals with a capital E) in the USA that are his primary concern, and he sees weaning of them off certain theology A commitments as central to breaking down their resistance

to "green" concerns such as climate change. The alliance between the political and economic conservatism of the Republican Party and Evangelicals needs to be loosened. He presents evidence that it was not always so, that Evangelicals did in fact have a green agenda, but it was stifled by their alliance with the Republican "Grand Old Party" and their economic masters.

I have some concerns with this strategy. It places too much of a focus on America and Christianity. The two most populated nations, India and China, have quite different cultural assumptions and are the key players in any solution to our climate change issues. And more importantly, the rate of cultural change is far too slow to produce change on the timescale we need. The cultural forces Tyson is talking about that formed PDT took centuries to create their impact. Seeking a cultural solution may take a century at least, and that is simply too long. We need solutions measured in a couple of decades: technological developments to shift from fossil fuels; economic tools such as divestment, carbon taxes, renewable incentives; and political pressure to counter the relentless lobbying of the fossil-fuel industry that wants to maintain business as usual, even if it means destroying the planet as habitable for human beings.

Neil Ormerod
Alphacrucis University College;
Australian Centre for Christianity and Culture
July 2023

https://doi.org/10.58913/XUUJ2230

Derrick Peterson: *Flat Earths and Fake Footnotes: The Strange Tale of How the Conflict of Science and Christianity Was Written into History*

Eugene, OR: Cascade Books, 2021; 378 pages
ISBN-13: 9781532653339

Derrick Peterson is described as an adjunct professor at Multnomah University and Seminary in Portland Oregon. He is a writer with several science- and religion-related articles at http://agreatercourage.blogspot.com/.

This book is another which contributes to the growing collection of works that revises and demolishes the myth of the warfare of science and religion. Peterson's style is easy reading, detailed, and at times ironic and humorous. This book can be read by any interested lay reader, although the detail and research will be useful to academic readers.

In the first part of the book, Peterson traces important developments leading to the dominance of the warfare myth (also known as the Draper–White thesis, following the works of Andrew Dickson White and John William Draper). He demonstrates the breadth of myth-shattering information, tracing the rarely reported backgrounds to well-known incidents.

He follows the deletion of theology from early-modern discourse to the rediscovery of the Christian contribution to the development of science in the work of Pierre Duhem, the influence of Comte's logical positivism and eighteenth-century French secularism through to the fall of logical positivism in the mid-twentieth century.

The second part re-examines these contributions to the rhetoric of Huxley and the X-Club, and to the writings of White and Draper and their promotion by Edward Youmans in *Popular Mechanics*.

The third part begins with a titular chapter that discusses many reported examples of supposed support for a flat earth and the misleading trails of references and footnotes used to give these stories false legitimacy. It then discusses the way that the contributing stories to the

myths are not actually supported, by highlighting either the non-existence or misrepresentation of documents. Peterson lists many such examples across medieval sciences. To illustrate this from Peterson's pool of examples of the distortion of document historiography are the papal bulls quoted by White that purport to show the church's opposition to medical dissection. The first example, *The Church Abhors the Shedding of Blood*, does not exist. The other, *Of Detestable Cruelty*, while actually existing, refers to the late-thirteenth-century funeral practice of cutting up a corpse and boiling off the flesh in order to make transport of the remains easier.

Careful examination of the evidence behind the myth-builders' historical allegations commonly shows that reality does not match the propaganda. The supposed denunciation of Andreas Vesalius by the Inquisition for dissection was actually for cutting open someone "who—unhappily—was still quite alive" (p. 246).

Peterson is similarly convincing about debunking treatment of the myth of the dark ages, the supposed flat earth, the church's alleged opposition to heliocentric theory, the burning of the library at Alexandria, and church opposition to Darwin.

Peterson revisits the infamous 1860 Huxley–Wilberforce debate in the recollections of the actual keynote speaker of that meeting of the British Association for the Advancement of Science, John William Draper. Peterson cites the recent discovery and publication of Draper's letters by ISCAST fellow James Ungureanu. These were written following the meeting. Huxley's contribution to the evening was so forgettable that Draper does not even mention him.

Peterson recites a litany of examples of agenda serving the rewriting of, and outright fabrication of, events. Ironically, much which began as anti- established church rhetoric later became fuel for atheistically driven deletion of Christian influence. Peterson writes of a contemporary example, that of an education text: "A world history textbook left out the Protestant Reformation. The fate of religion appears to be warfare or deletion; often both simultaneously" (p. 317).

Trails of false footnotes are detailed. For example, White cites the Columbus tale: Columbus standing firm against vigorous flat-earth opposition by a Grand Cardinal of Spain. White cites Irving (Rip van Winkle) who is "having a laugh, hardly bothering to cover up his ruse. He (Irving) is, in essence, saying with this fake footnote: 'somewhere in the French royal library there are unnamed, unspecified documents which totally support my story'" (p. 191).

Peterson is widely read and refers to important recent work in the field. The reader may regret the content that Peterson has left out of this volume. Nevertheless, what he has included is well worth absorbing.

In summary, this book is good value, worth reading, and an excellent addition to the study of the development of the warfare myth. It is to be hoped that it will contribute to that myth's worthwhile demise.

Robert Brennan
Wontulp-Bi-Buya College
August 2023

John F. Haught: *Is Nature Enough? Meaning and Truth in the Age of Science*

Cambridge: Cambridge University Press, 2006; 215 pages
ISBN-13: 9780521609937

This is a seminal work by a distinguished research professor of theology from Georgetown University, Washington DC. It was published in 2006 and he has written several books since this one (the latest named *God after Einstein* from 2022), but it remains an important contribution to the whole debate of whether the natural world represents all there is ("naturalism"). As might be expected, the author's answer to the question in the title is "No!" with the reasons for that answer carefully set out in 12 chapters, dealing with topics such as Life, Emergence, Purpose, Morality, Suffering, and Death.

The central argument is that "critical intelligence" is a key concept missing from naturalistic arguments. With successive emergences (life from non-life, intelligence from non-intelligence, mind from non-mind, and so on) "critical intelligence" (including the strong "desire to know" exhibited by humans), is something naturalists tend to dismiss, despite, quite paradoxically, sometimes appealing directly to these concepts. In particular, there appears to be no good reason, based on naturalistic axioms, for Darwinists to trust their own minds (since according to them, mind is a product of random variations, selection pressures and oodles of time)—and yet they do, in their writings and public debate. To quote Haught "naturalism, I am convinced, would be a cognitionally ruinous belief system if it were ever taken consistently—which it almost never is because of the innate trust in being and truth that empower even the minds that profess to follow that creed" (p. 208). In other words, the naturalist's creed implies that mind is a random end-product rather than "critical intelligence," or highly valued "key to it all." Trust of mind is central to naturalism but is denied by the "naturalist creed."

Another area where naturalists tend to be inconsistent is on questions of morality. Haught points out that moral behaviour to a Darwinist is couched in terms of survival of the gene pool rather than an individual sense of "oughtness." However, evidently "naturalism is rooted in a profoundly ethical belief system … you cannot miss the moral idealism that pervades their work" (p. 151, referring inter alia to Dawkins). Thus, the very thing they dismiss as a chance phenomenon is the authority they appeal to in relation to their own work and the assumption that it ought to be believed and followed. In particular, according to naturalists, the supernatural *ought not* to be believed in.

Haught refers many times to the open future encapsulated in theological accounts of human existence—that there is a hope for the future and a looking forward to the "not yet." This is contrasted with the rather closed view of naturalism, with death as finality and no persistence of truth. If humanity were to be wiped out then all truth would perish also, since according to naturalists, truth is a construct

of mind. He asserts there is something imperishable about truth, and the basis for its truthfulness must reside somewhere other than in perishable minds alone. Regarding life beyond death, "a sufficient foundation for this trust cannot be found exclusively by looking back to the causal past but only by taking into account the mind's innate anticipation of a fullness of being, truth, goodness, and beauty looming on the horizon ahead" (p. 209). In Haught's view, this "anticipation" is not an invented fiction but a "general hallmark of cosmic process" (p. 210); in other words, the emergences mentioned above speak of continuing revelation and a bright future.

In the science–religion debate, faults do not lie solely on the misapprehensions of naturalists. Haught notes "it is entirely appropriate to keep telling the old stories about the origins and end of suffering, but not … as though Darwin never lived and evolution never happened" (p. 171). "Theology should never be seen as an alternative to good science" (p. 172) and, in particular, theology needs to take into consideration non-human suffering in an overall appraisal of this topic. However, apart from vague notions of gene-pool advantage from the adaptive nature of humans facing suffering, Haught argues that "Darwinian naturalism could never, even in principle, penetrate to the core of religion or theodicy" (p. 180). Suffering, in a sense, is a consequence of an unfinished initial creation. Haught argues that if this creation was perfectly finished, then the world would not be distinct from its maker, a pantheistic view Haught emphatically rejects.

The human "desire to know," with an imperishable critical intelligence, naturally leads individuals on to fullness of being and a valuing of the mind, which appears absent in purely naturalistic accounts of what to expect in the future. A theological account of hope for the future includes belief in continuing emergence and in particular a "power of the future." Haught explains this phrase: the openness of the future (rather than the perceived closed notions of naturalism) represents a power or "potentiation." Further, he suggests that this "power of the future" is the best name for God, whose central action is the "arrival of the future" (p. 214).

I hope I have conveyed from these summary paragraphs and quotations the flavour and the main thrust of what is quite a challenging read, but a refreshing one. Often the answers to the question of what is missing from naturalist accounts of existence are somewhat unsatisfactory, but not so in this account. A book worth reading then re-reading. At 215 pages this is doable. The style is quite scholarly, and reading the book requires some concentration to follow the well-reasoned arguments. The intention, according to the back cover, is to "provide the basis for discussion among … intellectually curious people in general" and the style is very suited to this readership.

Andrew Wood
Swinburne University of Technology
September 2023

Elaine Howard Ecklund and David R. Johnson: *Varieties of Atheism in Science*

Oxford: Oxford University Press, 2021; viii + 216 pages
ISBN-13: 9780197539163

That this book was published by Oxford University Press says a good deal about its significance. The authors—a sociologist and an educator, both based in the USA—surveyed over 22,000 scientists in physics and biology across the USA and UK about their understanding of science and religion, and then held follow-up interviews with hundreds of respondents. Their findings are documented in this volume, which is intended for anyone interested in faith–science relationships.

Varieties is elegantly organised, uses quotations effectively, and is sensitive to issues of gender and cultural diversity (see the table on p. 34). Care is taken with the different national contexts (USA or UK) in which science is undertaken. In the UK, where the Church of England (oddly named "Anglican") is established, church attendance may be lessening, but en-

gagement between the academy and religion is of long standing, and (as one of the US authors notes of the UK) "scientists here, although less religious on the whole, are just plain friendlier and easier to talk to" (p. 154). In the USA, church and state may formally be separate, but religion permeates society, and "the conflict narrative is much more pronounced in the public sphere" (p. 155) and among evangelical Christians (pp. 144–5).

The opening chapter asks, "Why Study Atheism among Scientists?" Both the "scientism" that breeds hostility to religion, and growing public suspicion of science (e.g., due to technology leading to climate change) are of concern for the common good—and for science. Richard Dawkins' books were often mentioned in the interviews, but many viewed his hostility to religion as counterproductive. Further, the study shows that atheist scientists are not all alike: there is a spectrum of "conflict to complementary" relations between science and religion.

I suggest that readers turn next to the Appendix: Studying Atheist Scientists. Despite the small type, its dozen pages give helpful details not only on the study's exemplary statistical methodology, but on what the project is about.

Chapter Two explores why many scientists are atheistic in outlook. Although science plays a key part in atheists' worldviews, the research finds that it is not its direct—in classical terms, its material or efficient—cause. Over half those surveyed (in both the UK and USA) grew up in atheist households, predisposing them to hold an atheist worldview. This reflects cultural shifts in the West over recent decades. For those with church links in their youth, bad experiences with religion (whether from people, structures, or beliefs) and inability to explain evil or suffering were major factors in adopting atheism. In the USA, college was a key time for many moving away from religion as they left their family.

Chapters Three, Four, and Five cover the three main types of atheist scientists found in the study. "Modernists" (66% USA, 73% UK) reject all religion or spirituality; the New Atheism is a significant factor here. "Culturally Atheist Scientists" (28% USA, 21% UK) continue to associate with some religious practices. A case study of Jews is interesting here: many who are not believers nevertheless participate in

https://doi.org/10.58913/KXUT7988

culturally significant events. "Spiritual Atheist Scientists" (6%) may use meditation in their work or find wonder in science. These chapters include a multitude of intriguing insights: how do attitudes to marriage interact with the varieties of atheism, for example?

Chapter Six, entitled "What Atheist Scientists Think about Science," I found of most interest (it is also the longest). All those surveyed agreed that "scientific method" and curiosity are central. But the questions, "Are there limits to science—and should there be?" and "What wider community relationships matter?" were not furnished with answers. The project detected "scientism" in about a third of the "modernists." For most, this is an often-harsh worldview. For others it includes a humility about what can be known with certainty. This chapter made me more aware of how my assumptions about life (health, gender, experience, age, worldview …) as well as my academic discipline(s), affect what I think "science" is and involves. It would make a great basis for conversation.

Chapter Seven outlines how the three "varieties" (and their subsets) see meaning in life. Some respondents are quite nihilistic. I'd want to ask them, how long is it since you have been at an art gallery / rock concert / picnic / nursing home / forest walk …? Some respondents do not find science "emotionally satisfying" and seek meaning elsewhere: David Hume is cited to illustrate the tendency to "compartmentalise" life into science, household, and community life, and other cupboards. Several scientists find meaning in the way their work helps others, spurring "progress" in the human community, or by "making a mark." In the USA, the report notes, atheists are commonly assumed to be immoral, but just half a dozen pages are given to morality. Given the scientific method, "empathy" and "equality" are found to undergird the ethics of some atheist scientists.

The authors identify as religious, presumably Christian given their US base. However, the only theological work in the extensive bibliography is *Christian Theology* by Millard Erikson, a mainstream evangelical textbook—with its author referred to as Erikson Millard! This meagre reference would seem to indicate that the authors' theological

https://doi.org/10.58913/KXUT7988

background is minimal, but also that there is need for theological exploration of what "atheism" means for many today.

A short concluding chapter, "From Rhetoric to Reality," takes the research outcomes towards action. Its main message is that space is needed "where atheist scientists and religious believers can *find their own* connections" (p. 149, emphasis added; this does not mean more conferences!). The final heading is, "Why We Should Care" (p. 150). The answer given is: for the well-being of science, religion—and the common good.

An Index concludes this significant publication, which I have no hesitation in commending to interested readers.

Charles Sherlock
Ridley College; Trinity College; University of Divinity
September 2023

David Bradshaw and Richard Swinburne (eds.): *Natural Theology in the Eastern Orthodox Tradition*

St Paul, MN: IOTA Publications, 2021; xii + 204 pages
ISBN-13: 9781735295138

The volume here considered includes seven contributions preceded by an introduction. The editors, David Bradshaw (Professor of Philosophy at the University of Kentucky) and Richard Swinburne (Emeritus Professor of the Philosophy of Religion at the University of Oxford; Fellow of the British Academy) are Orthodox Christian philosophers. The volume explores the suitability of the idea of natural theology—understood as "the attempt to support the existence of God, and to investigate the divine attributes, through philosophical reasoning" (p. 1)—for Orthodox Christian ways of knowing. Its aim is to retrieve natural theology as integral to Orthodox Christianity's patrimony. The volume is meant for historians of culture, philosophers, religious studies

scholars, and theologians, the contributions illustrating high academic standards that exceed the reach of average readers.

The challenge the volume addresses is the fact that natural theology was, and largely remains, typical for Western Christian thinking. The chapter by Richard Cross shows just that ("Medieval and Early Modern Natural Theology in the West"; pp. 65–88). The opinions presented within this volume are not of one piece. Thus, Richard Swinburne ("Natural Theology for Today"; pp. 175–196) firmly believes that natural theology suits Orthodox Christianity, with a range of contributions, by Alexei Fokin ("Natural Theology in Patristic Thought: Arguments for the Existence of God"; pp. 23–50), David Bradshaw ("Natural Theology in St Gregory Palamas"; pp. 51–64), and Paul Gavrilyuk ("Natural Theology in Modern Russian Religious Thought"; pp. 89–124), providing historical evidence that supports this view. Their contributions fortunately complement the unilateral account of the facts in *The Oxford Handbook of Natural Theology* (John Hedley Brooke, Russell Re Manning, and Fraser Watts, eds., 2013), which, except for Christopher Knight's input (pp. 213–226), makes no reference to non-Western Christian authors. In turn, by examining the thinking of several modern and contemporary Orthodox authors, Dionysios Skliris ("Reactions of Modern Greek Theologians to Natural Theology"; pp. 125–148) and Travis Dumsday ("Experiential Objections Against Natural Theology in Some Recent Orthodox Thinkers"; pp. 149–174) present the contrary view.

The volume undertakes to show that these stances are not irreconcilable. Bradshaw's contributions, that is, the chapter referred to above and the "Introduction" to the volume (pp. 1–22), suggest that they complement one another. Their complementarity, in turn, would secure the coherence of the volume itself. The argument Bradshaw puts forward is, to a large extent, compelling. In short, Orthodox Christians of past and present times have been combining various ways of knowing, ranging from rational and fideistic to experiential, contemplative, and mystical perspectives (pp. 4–15, 51–52). There would be room for natural theology, too.

https://doi.org/10.58913/QRDB7096

One of the most important lessons of this volume is the point of Bradshaw (pp. 4–8) and Swinburne (pp. 190–193), namely, that ancient and medieval theologians capitalised on arguments for God formulated by other cultures, including the available sciences, which they adopted, reinterpreted, and further developed. Theology is not insular, we learn. Relatedly, Swinburne points out that contemporary natural theology should devise new arguments that take into consideration the scientific culture (p. 194). This is an excellent reminder of the fact that, naturally, theology spearheads in two directions, engaging both those within and the outsiders. The two forms of discourse differ significantly but they cross paths often, including by deploying arguments pertaining to natural theology, sometimes drawing upon the available sciences. The usefulness of natural theology is unquestionable, regardless of the type of discourse that nestles it. Especially when it comes to outsiders, arguments derived from faith, the church's inner life, and the mystical experience (such as those discussed at pp. 149–174) cannot suffice. It is there that natural theology reigns.

But, I would say, to consider natural theology autonomous from the Christian experience, as Swinburne appears to propose (pp. 175–190), is unprofitable, unless it amounts to an academic exercise. For the Orthodox Christian tradition (see pp. 23–50, 51–64, 125–148, 149–174), an independent natural theology is as illegitimate and ineffectual as the modern separation of systematic, pastoral, liturgical, historical, and biblical theologies. This is more so today, when the age of natural theology in its classical form, of logical persuasion, is over (see Keith M. Parsons, "Perspectives from Analytic Philosophy," in *The Oxford Handbook of Natural Theology*, pp. 247–261, esp. 259–260). It is not over because the logic of natural theologians is faulty; as Swinburne's chapter shows, the logic is actually sophisticated. It is over because contemporary scientific culture does not draw conclusions based on logic; conclusions must be tested experimentally and substantiated factually. A different kind of rational persuasion is needed, therefore: one that builds, say, upon scientifically established facts *and* spiritual insight—moreover, one that works at the nexus of many disciplines, in patristic

fashion. In suggesting this, I partially agree with Bradshaw and Swinburne's proposal that natural theology can, and should, be redeployed by Orthodox thinkers.

That said, I take exception to the fact that Swinburne presents Orthodox Christianity as welcoming a kind of natural theology that matches scholastic and modern rationalism. There are cracks in the wall of this assumption. On the one hand, Bradshaw and Fokin's chapters highlight the complexity of patristic and Byzantine ways of knowing, ultimately anchored in experience. On the other hand, as Skliris and Dumsday show, experientially obtained knowledge has moved major contemporary Orthodox theologians to oppose natural theology in its scholastic sense. Bruce Foltz (*The Noetics of Nature: Environmental Philosophy and the Holy Beauty of the Visible*, 2014) and Christopher Knight (*Eastern Orthodoxy and the Science–Theology Dialogue*, 2022) refer to this type of knowledge as "noetic" perception and consider it irreducible to rationalism. True, as Gavrilyuk's contribution shows, rationalism fared well in certain early modern Russian circles. But this trend matches what Georges Florovsky famously called the "Babylonian captivity" of Orthodox theology (*Aspects of Church History*, 1987; pp. 157–182), not a traditional way of knowing. What Florovsky meant by that phrase is the estrangement of Orthodox theology from its tradition by cultivating Western intellectualism. Against this backdrop, the idea of an Orthodox Christian natural theology emerges as a loaded concept unless we understand it outside the rationalist paradigm.

Be that as it may, the volume under consideration adds new dimensions to the complex world of natural theology, for which the editors and the contributors should be warmly congratulated.

Doru Costache
ISCAST and the Sydney College of Divinity
October 2023

https://doi.org/10.58913/QRDB7096

Philip Hefner: *Human Becoming in an Age of Science, Technology, and Faith.* Jason P. Roberts and Mladen Turk (eds.)

Lanham: Lexington Books/Fortress Academic, 2022; 246 pages
ISBN-13: 9781978708372

Perhaps one of the most problematic questions one can encounter is: What does being "human" denote, especially in the present technologically charged milieu? The book *Human Becoming in an Age of Science, Technology, and Faith* is the culmination of the scholarship of the celebrated Christian theologian, Philip Hefner, on his seminal definition of human beings as "created co-creators," a definition which made its debut close to forty years ago in *Christian Dogmatics* (1984; Carl Braaten and Robert Jenson, eds.). Arguably, the created co-creator model has contributed significantly to the anthropological dialectics within the scholarship of Christian theology and science, having garnered several accolades—and criticisms. Perhaps its most appreciable success is the impressive representation of the advancements in science and technology as an integral part of the active continued process of creation and of human *becoming* (p. 11).

The book is both a monograph and an edited collection of responses, the latter intelligently synchronised by editors Jason Roberts and Mladen Turk. The book's content, grammar, and style are very engaging and intellectually stimulating, making it accessible to various readers—academics and non-academics alike. The book is divided into three parts with thirteen chapters. The first part, made up of five chapters, is written by Philip Hefner and expresses his concluding thoughts on the created co-creator model. Here, Hefner aptly reiterates his convictions (despite several criticisms) about the adequacy of the created co-creator model as a capacious framework for answering the problematic question of human identity today and for the impending future (p. 16). For Hefner, the enterprise of "becoming human" can be thought of in terms of a metaphor and a symbol of present reality as well as an unfolding process of our *becoming* as humans; a "memoir," with humanity

being memoirists of the journey. He remarks, "We are discovering that our experience in the world is moving us toward new understandings and interpretations of who we are … we are caught up in a process of becoming that requires fresh ideas … images of ourselves … as creators and created co-creators" (p. 18). The highlight of this section was his confrontation of the greatest challenge facing humanity as co-creators: the advance of AI and robotics. "The more perfectly robots serve human needs … the more like us they will become … they may not be humans, but they will be functioning like human creatures. The human-created co-creator will have created its own co-creator" (p. 70). With rapid advancement in technological creation in the image of humanity, the extent to which AI systems and technology will accurately mirror all that it means to be human remains debatable and open to conjecture. Hefner's reference to a three-phased creation or creative activity, God–Humans–Robots, is delineated with consistent reference to a "threshold," which, in cosmic terms, is imminent as humanity grapples with climate change and other negative consequences of our creative prowess. Hefner argues that once the "threshold" of creating in our (human) image has begun, there is not a question of stopping it, only that it must be done "thoughtfully and soberly" (p. 76), even though such a clause is undoubtedly malleable and subject to divergent opinions, interpretations, and use cases.

The book's second part features extended responses from Jason Roberts and Karl E. Peters. Roberts beautifully crafts a Protestant trinitarian re-presentation of God the Father, the Son, and the Holy Spirit as creator, redeemer, and sustainer respectively, in an analogous reference to humanity as co-creator, co-redeemer, and co-sustainer (p. 85). His argument unveils the theological tension created by the near conflation of "creator" and "creature" in ideological and pragmatic terms since humanity wiggles between being creators and creatures at different points, which ultimately presents humanity as "playing God" in many instances (p. 94), such as noted by critics of transhumanism and allied scientific expeditions. Karl E. Roberts expounds on creativity, co-creating, and the common good of society, especially considering numerous ethical concerns emerging from the limitless technological creativity of humanity.

https://doi.org/10.58913/AAGE6655

The third part of the book is a compilation of reflections from several authors such as Ted Peters who writes about the cosmic meaning of being human and the crisis of technological civilisation as the direct outcome of humanity's creative activities. Anna Case-Winters has a chapter titled "Knowing our Place: In the Image of God, at Home in the Cosmos" and Ann Pederson writes about icons and images and the representation of all creation as created co-creators. Gregory Peterson focuses on institutional interpretations of the created co-created model, while Mladen Turk writes on the idea of "uncertainty" as humanity unravels our becoming, and on the place of skepticism in our knowledge of humanity as co-creator and of the divine as Creator.

As beautifully curated as the book may be, it is not without its shortcomings. Some (not all) aspects of the second and third parts of the book appear as a reiteration of previously established ideas in the first part of the book. Perhaps the book could have been best presented as two separate publications with the second and third parts expanding and building off the created co-creator model, not necessarily a "response" to it. Also, the use of symbol and metaphor to describe the created co-creator model subliminally obscures the harsh realities of the negative consequences of technological exploits and ingenious scientific achievements. The perpetual effects and aftermaths of technological and scientific human creativity are not metaphors but present realities that all of creation must grapple with.

Notwithstanding, the book is an impressive compilation of the intersection between Christian theology and technological developments. Many ideas and concepts in scholarship often lose relevance over time, but the created co-creator model has managed to remain viable for decades. The book is highly recommended for any curious reader interested in the traditional understanding of humanity as created in the *imago Dei* and contemporary bio–techno–scientific ways of defining humanity.

Blessing T. Emmanuel
University of Georgia, US
October 2023

John H. Walton: *The Lost World of Genesis One: Ancient Cosmology and the Origins Debate* and *The Lost World of Adam and Eve: Genesis 2–3 and the Human Origins Debate*

(Downers Grove, IL: IVP Academic, 2009); 192 pages
ISBN-13: 9780830837045

(Downers Grove, IL: IVP Academic, 2015); 258 pages
ISBN-13: 9780830824618

It is so good to read an *original* book, one that goes back to origins. Both members of this closely related pair are exemplary here. Walton not only delights in the Christian Scriptures in their original languages, but also the contexts in which they were set. Hebrew terms are analysed thoroughly in ways accessible to all readers, and full citations made of a raft of ancient Babylonian and similar texts. All are treated with respect and care.

John H. Walton teaches Old Testament at Wheaton College, Illinois—a bastion of intelligent US evangelical thought. His target audience is Christians for whom "science" raises issues around the origins of the universe, and human beings in particular. These issues are addressed, and fully, but always with biblical authority front and centre. Decades of engaging with students for whom these things matter lie behind the writing.

Each book is arranged as a series of Propositions—rather like scholastic method but much more accessibly. Two examples are "Proposition 7: Divine Rest is in a Temple" from the first book, and "Proposition 20: It Is Not Essential That All People Descended from Adam and Eve" from the second. The approach sounds awkward, but it works: the writing is clear, and consistently directed to the topic in hand.

A consistent theme is that what the Bible teaches must be understood against the culture of the writers involved. Walton is scrupulous in citing ancient texts fairly, to illuminate rather than control Old Tes-

tament passages. A notable feature is the significance of "sacred space" and the place of "temples" in human life in the Genesis texts considered.

The Lost World of Genesis One has 18 Propositions, roughly alternating between outlining ancient cosmologies and how these assist in understanding Genesis 1. That God is the Creator of all is affirmed strongly but it is concluded that the text says very little about modern historical and scientific concerns. This does not mean that Genesis says nothing to us, however! Walton's calmly inspiring exegesis encourages a whole-hearted response to God's work in and purposes for creation—and new creation.

Summarising Walton's conclusions might stop you reading his book! His overall argument—to my mind, a convincing one—is that Genesis 1 describes God creating functions from "non-order" in terms that matter to humans: time, weather, food, and space, then functionaries that order these. The climax is God taking up his presence in the cosmos as "temple," resting from work in order to rule (what does this mean for the Sabbath?).

The Lost World of Adam and Eve opens with five Propositions that summarise issues of hermeneutics covered in the earlier book. From then on, however, we are taken on a lively, intriguing, and refreshing engagement with Genesis 1–3. Did you realise that "other half" is a better translation than "rib" for Eve? Had you ever thought of Adam and Eve as "priests in sacred space"? Walton makes no reference to feminism, but his exegesis raises helpful insights into gender issues as well as scientific concerns.

A brilliant discussion of "sin" in Genesis 2–3 in Propositions 15–18 is the second book's highlight, with a magnificent discussion of how Paul takes this up in Romans 5 and 1 Corinthians 15 (aided by N. T. Wright, though not as readably!). Walton engages effectively with the Western theological tradition on the "image of God" and (origin-al) sin from Augustine on. He argues that this unhelpfully over-emphasises what we are saved from, rather than the vocation to which we, and creation as a whole, are called.

The final Propositions in both books turn from the biblical text to address specific issues raised by modern sciences—"big bang," evolution, genetics, and the like. The focal question is consistently "What *precisely* does the Bible affirm about these?" The temptation for Christians who are scientists to skip to these chapters must be resisted: the books as a whole shed light on research method and conclusions, which matter far more for science.

I wish I had read these books when I began teaching theology 50 years ago. As it happens, my approach to the doctrines of creation and theological anthropology run along similar lines to Walton, but not nearly as creatively.

This pair of books should be texts in every introductory Old Testament course, in every church library—and read by scientists for whom Christian faith raises problems. I have no hesitation in commending them warmly.

Charles Sherlock
Ridley College; Trinity College; University of Divinity
October 2023

Elaine Howard Ecklund: *Why Science and Faith Need Each Other: Eight Shared Values That Move Us beyond Fear*

Grand Rapids, Michigan: Brazos Press, 2020; 176 pages
ISBN-13: 9781587434365

This book was slightly different from what I had expected. This is not a criticism of it, but a reflection of my own expectations as a scientist and ethicist. Ecklund is neither. She is a sociologist, who founded the Religion and Public Life Program at Rice University in the United States. She has a well-acknowledged reputation for her sociological studies on

the relationship between science and faith, and in this book she seeks to make her results accessible to a general readership.

Throughout she inserts personal comments regarding the serious health issues she has had to face from an early age. Indeed, her sociological studies on the interaction of science and faith were prompted by these personal life experiences. This gives the text a flavour not generally found in books dealing with science and faith, since they give to her writings a practical edge rather than a theoretical one. Her use of these instances is wise and serves to bridge the science–faith divide at a number of significant points in the biomedical area.

Her understanding of the science–faith borderlands is secure, as she repeatedly delves into this territory. Her studies over many years have covered what religious believers think about science and what scientists think about religion. The scientists she has studied have been both Christians and nonreligious. Although Ecklund has interviewed individuals from many countries, the book is firmly set within an American context. This means that it reflects American evangelicals and the American evangelical scene. Hence, the views and attitudes are those of this subculture, especially when it comes to the responses of the rank-and-file within evangelical churches. While this does not detract from the validity of the conclusions Ecklund arrives at, there is no escape from the limits imposed by these horizons.

Over the years Ecklund has surveyed 41,000 religious believers and scientists on the relationship between religion and science. She has also conducted 1,290 in-depth, face-to-face interviews within this broad cross-section of individuals. Rather than overwhelming the reader with figures, she sparingly uses percentages. For example: 54% of Protestants see gene editing (to reduce the risk of serious diseases in babies) as meddling with nature, compared to 31% of those with no religious affiliation (p. 104; all figures are backed up by references). The way in which she brings these figures down to earth is by the use of quotes from individuals surveyed. The danger, of course, with this approach is that the author has to be very careful that they are representative of the major groups she is interested in, namely, church

leaders, evangelical Christians in churches, evangelical scientists, and nonreligious scientists. As far as I can ascertain from my knowledge of science–faith debates, she is fair to these various groupings.

Ecklund never strays far from her central theme, namely, the way in which science interacts with religion, mainly evangelicalism. Of all the groups, the most problematic appears to be church leaders, depending upon the topic. This may be unfair on them since some of the topics require considerable expertise. But this is helpful since it highlights the limited degree to which Christians can realistically look to their minister for helpful direction in the science-faith area (with some notable exceptions). Ecklund considers that the input of Christian scientists in their congregations and communities is vital and should be utilised far more than is frequently the case. Ecklund makes these points eloquently in one area after another. From my own experience I have frequently lamented the pitiful degree to which scientists in churches are asked for advice, let alone listened to.

The book is divided most interestingly into what Ecklund describes as eight shared values, that is, values shared between science and faith. These are curiosity, doubt, humility, creativity, healing, awe, shalom, and gratitude. Under these headings, she discusses matters such as the fear of science in churches, doubt as a virtue in Christian communities, the place of humility in churches as well as in science, the importance of recognising creativity in medical areas such as infertility, the place of awe in science, and our limited appreciation of gratitude in all areas of our lives. There are many riches here, applying to the interactions between science and faith. By setting out virtues in this manner, Ecklund can probe into specifics and demonstrate surprising commonalities between the approaches of the scientist and the Christian believer.

There are few topics at the intersection of science and faith that are not touched upon. Readers will not be provided with the final word on any of these topics, but they will get an insight into the large number of similarities between scientific and religious values, and for most people this will come as a surprise.

It would be wonderful if this book were to be read by church ministers and others in leadership positions in churches, especially those sceptical of the legitimacy of science and those still thinking that the warfare between science and religion is alive and well. The ignorance of some churchgoers quoted in the book is horrifying. If the pervading ignorance in churches can be transformed and enlightened by this book, it will have served its purpose.

D. Gareth Jones
University of Otago, New Zealand
November 2023