



BIOLOGY

THE SOCIETY OF GENES by Itai Yanai and Martin Lercher. Cambridge, MA: Harvard University Press, 2016. x + 282 pages. Hardcover; \$27.95. ISBN: 978-0674425026.

I begin with a confession (a good Christian thing to do): I am neither a geneticist nor an expert on genes, so I am not qualified to comment on some of this book's more technical aspects. However, as the authors state, they "wrote this book for a general audience, assuming no background in biology on the part of the reader" (p. 3). That said, while most aspects of the presentation are straightforward, at various points a willingness to delve into some of the more technical language of genetics (such as FOXP2, SOX9, BRCA1, SINE, LINE1, Alus, MIR) is required. General readers may be familiar with some of these terms, such as BRCA1 and BRCA2 (BRCA1 and BRCA2 are breast cancer genes), but are unlikely to be familiar with all, especially those whose designations are less obvious.

Yanai and Lercher state that they were motivated to write this book in the spirit of Richard Dawkins's book *The Selfish Gene*, published forty years ago, which they admire and describe as "essentially correct." So why write another book on genes? Genetics has moved on a long way since Dawkins wrote *The Selfish Gene*, so that much that was unknown then is now known. In particular, the authors focus on what has been discovered about how genes interact and the results of their interactions, a fascinating area of research. For this reason, they choose the metaphor of "the society of genes," genes collaborating and competing along the lines of the economic model proposed by Adam Smith in the eighteenth century. In Smith's model, selfish (self-interested) individuals compete and collaborate. Here, selfish genes compete and collaborate in a society of genes to their own benefit; this is an extension of Dawkins's selfish gene metaphor.

Yanai and Lercher state that "the genome ... is best seen as a conglomerate of selfish genes, held together by an intricate network of cooperation" (p. x). Despite their disclaimer that "[a]nthropomorphising provides a convenient shorthand ... we need to remember the full description behind the shorthand," I am not convinced that this metaphor, as with Dawkins's original metaphor, is helpful (p. 38). Genes are not active agents in the sense that human beings are in Smith's economic model. When the authors state that "each allele 'works' toward its own advantage when cooperating with its peers, exempli-

fying Adam Smith's hypothesis that self-interest, if channelled appropriately, maximises the common good," I think they are in danger of being misled by their own metaphor (p. 46). If organisms are "survival machines" for genes (to use Dawkins's terminology), then which common good are the genes maximizing? Not necessarily that of the organism, or even that of the so-called community of genes. For example, cancer genes will kill the organism and so destroy themselves and their fellow genes without exhibiting the slightest qualm. Yanai and Lercher's use of Adam Smith's economic model as an analogy for how genes work seems problematic. In the case of cancer genes, the analogy of a suicide bomber seems much more appropriate.

The flavor of the book can be obtained by considering a selection of topics from various chapters. Chapter 1 is a clear description of the genetics of cancer. This is the springboard for chapter 2, which examines "how your enemies define you." This chapter begins with an explanation of how bacteria incorporate information into their own genome from viruses that are attacking them, thus becoming better able to defend themselves from similar attacks in the future. While this works well for single cell bacteria, the authors point out that it is not a technique that will work for a more complex organism such as a human being. Instead, human genes allow us to manufacture antibodies to deal with intruders in our body (the authors then describe the genetics of this process).

The next chapter explores the genetics of sex. The authors say that the point of sex is that it allows the members of the society of genes to continually form new alliances and to work together more efficiently in the long run (p. 77), although what "more efficiently" means in this context is unclear. Through sexual recombination, harmful mutations can be left behind and helpful ones consolidated into the genome. An interesting conclusion is that if a man wants to reduce the mutational load passed on to the next generation, he should have children while he is young, when few mutations have accumulated in his sperm.

Chapter 4 examines the question: why does the small 0.1% difference in the genome of two individuals lead to such large differences among humans? Here, the authors seem to stray into dangerous territory, suggesting that "a small number of selfish genes (or even selfish ideas) are enough to underpin racist behavior" (p. 126).

The issue of how some genes manage and regulate other genes, turning them on or off, is described in chapter 7. This regulation allows for the develop-

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ment of a wide range of organismal characteristics (phenotypes) from the same set of genes. Chapter 8 describes gene duplication and horizontal gene transfer, whereby genomes can be enriched and enlarged. For example, horizontal gene transfer between bacteria has been shown to account for the spread of resistance to drug treatments. Chapter 9 explores the evolution of eukaryotic cells (ones with a nucleus, such as those in the human body) as a merger of an archaeobacterium and a eubacterium.

The final chapter describes genetic “freeloaders,” genes that seem to serve no useful purpose except to ensure their own survival. Occasionally these genes do take up a new function (exaptation in Stephen J. Gould’s terminology). In the human genome, the freeloaders hugely outnumber useful genes. Yanai and Lercher link this to the beginning of life on Earth around hydrothermal vents at the bottom of the ocean, where RNA freeloaders could have been abundant.

The book concludes with a paraphrase: “it is the society of genes that has brought us this far, but it is our humanity that must now bring us home.” I do not share Yanai and Lercher’s faith in humanity and prefer the original: “’Tis grace hath brought me safe thus far, and grace will lead me home” (from the hymn “Amazing Grace”). God’s grace is a surer foundation for humanity’s future than a purported society of selfish genes.

Overall, the book is a good introduction to modern genetics from a Dawkins-like perspective. A key message of the book is that many aspects of human biology are controlled by a number of genes acting together, rather than by a single gene. This exposes the lie of popular misconceptions such as our having a “god gene,” a “gay gene,” or an “alcoholism gene.” Yanai and Lercher see their book as Darwin saw his *On the Origin of Species*, as “one long argument” (p. 258).

In the tradition of one long argument, they conclude that “this book exhibits the explanatory power that comes from viewing the genetic makeup of a species as a society of genes” (p. 258). I would dispute that conclusion, not only because their argument does not seem to be sustained chapter by chapter, but also because I find the metaphor itself to be questionable.

Nevertheless, this is a generally readable book, giving an updated view of developments in genetics since Dawkins wrote his popularizing book on the same topic. The book’s major limitation is its gene-centric view of genetics. Other perspectives exist, such as the systems biology approach of Denis Noble

(a colleague of Dawkins at Oxford), as exemplified in his book *The Music of Life: Biology beyond Genes*. Likewise, Jablonka & Lamb’s book *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral and Symbolic Variation in the History of Life* provides a broader perspective. That Yanai and Lercher do not go beyond their gene-centric view might be due to a space constraint, but it might also be due to the constraint of their choice of metaphor.

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MATHEMATICS

REDEEMING MATHEMATICS: A God-Centered Approach by Vern S. Poythress. Wheaton, IL: Crossway, 2015. 200 pages, bibliography, index. Paperback; \$21.99. ISBN: 9781433541100.

Challenged by Kuyper’s declaration that faith affects all of life, Poythress begins his book with a keen interest in exploring how faith applies to mathematics. There are other books on the subject, but in this short book, Vern Poythress adds his own view to the mix. He introduces some of the theological and philosophical work of the Reformed theologian John M. Frame, for example, *The Doctrine of the Knowledge of God*, and he acknowledges the influence of the Reformed philosopher Dirk Vollenhoven. He challenges the notion that mathematics is merely secular; instead, to cite one argument, arithmetic laws are “in essence personal” and imply a lawgiver. Poythress observes that the rules and order of mathematics demonstrate the biblical principle that God upholds the world. He attributes mathematics to God’s law, a divine command, for the universe. Poythress tries to develop a philosophical position that steers away from both Christian Platonism and Christian empiricism.

While available in hardcover, *Redeeming Mathematics* is one of 20 free ebooks that Poythress has written. The list includes *Chance and the Sovereignty of God*, *Logic*, *Redeeming Science*, *Redeeming Sociology*, and *Symphonic Theology*. Many of his books share a variation of the subtitle “A God-Centered Approach” with the book under review. In this mathematics edition, Poythress leans heavily on his other work, such as *Redeeming Science*. In fact, some paragraphs are borrowed verbatim, and some of these words also appeared in his 2003 article “Why Scientists Must Believe in God: Divine Attributes of Scientific Law.” In other places he encourages the reader to consult his other works to get the full details of his argument. In the end, I would have preferred that the book

were self-contained and did not lean so much on his other works. His brief supplemental chapter on other resources could have been more robust and included, for example, brief commentary on the edited books by Bradley and Howell, *Mathematics in a Postmodern Age: A Christian Perspective* and *Mathematics through the Eyes of Faith*, or Byl's *The Divine Challenge: On Matter, Mind, Math and Meaning*, which are listed in the bibliography.

This book is not specifically written as an apologetic argument; rather, it is meant to help Christians consider Kuyper's clarion call in the context of mathematics. In a world that views mathematics as purely secular, Poythress aims to recover "a robust doctrine of God's involvement in daily caring for his world." Poythress leans heavily on the Reformed Christian apologist Cornelius Van Til, often via the work of John Frame. In particular, he draws on the concept of the Trinity to bolster his ontology of mathematics and he uses Van Til's analogical approach with an oft-repeated refrain that we are "thinking God's thoughts after him."

In chapter 1, Poythress ties arithmetic statements such as $2+2=4$ to some attributes of God, such as being immutable, omnipresent, and omnipotent. He develops the idea that arithmetical rules are part of the Law of God for creation, part of God's Word. He then describes the personal character of Law, the goodness of Law, the beauty of Law, the righteousness of Law, and the Trinitarian nature of Law, declaring that arithmetic participates in all these attributes. Through these, Poythress recognizes a nonsecular approach to mathematics. He observes that "people working with mathematics rely on God's Word in order to carry out their work" and exposes the nonbiblical notion that God acts in creation, but only in supernatural ways via miracles. After all, as noted in Psalm 104, God "causes the grass to grow." Poythress notes that laws reflect God's character, but in my mind, he takes the analogy too far. Instead of simply saying that mathematics captures part of God's regular working in the world, he equates the laws directly with part of his character.

In chapter 2, Poythress briefly addresses the philosophical problem of the one and the many, tying it to one's understanding of mathematics. He uses the concept of the Trinity to make sense of the unity and diversity of the created world, describing how the expression of unity and diversity in number concepts reflects God's character.

In chapter 3, he describes the limitations of a materialist worldview to answer the philosophical problem of the one and the many. He argues that

materialism does not adequately explain the origins of mathematics. In chapter 4, Poythress reflects on the nature of numbers. He attributes mathematical equations to God's speech, associating them with the divine characteristics of omnipresence, eternity, and omnipotence. In this chapter, he develops an analogical tie to the Trinity using Frame's three perspectives: normative, situational, and existential. He develops these perspectives to further connect arithmetic with God's character.

In chapter 5, Poythress describes Frame's square diagram for understanding transcendence and immanence in Christian perspective. He connects the square to different interpretations of arithmetic statements such as $2+2=4$. In chapter 6, Poythress covers the concepts of necessity and contingency with respect to God and mathematics, elaborating on the relevance of Frame's square for transcendence and immanence. He notes that numbers exist eternally, "not as Platonic abstractions, but as an aspect of God's knowledge." In a later chapter, he argues, based on the character of God, that numbers could be no different in any alternate universe.

In chapters 7–10, Poythress explores addition, the idea of succession, and multiplication. He develops curious links to the Tabernacle, the Trinity, and breeding animals. For example, Poythress argues that since God uses numbers to describe proportions for the earthly temple, this illustrates that numbers derive from God, instead of allowing for the fact that God may be communicating a broader principle using human-accessible terms. In chapters 11 and 12, he links symmetries and sets to the character of God. In chapters 13–16, Poythress links fractions, irrationals, and imaginary numbers to God via his three perspectives. In chapters 17–19, he touches on infinity, geometry, and higher mathematics before ending with a very brief conclusion. In the appendices, Poythress helpfully describes other philosophies of mathematics as well as other Christian approaches to the philosophy of mathematics. He describes Christian Platonism as well as a Christianized empiricism, giving critiques from his perspective.

There are a few places where Poythress could have taken more care in his writing. Some chapters start with stunted introductory paragraphs that deserve to be developed. He makes a speculative conjecture about the etymological roots of the word "irrational," tying it to later decimal representations instead of to the ambiguity of the Greek word for ratio within the context of the Greek worldview. He incorrectly states that imaginary numbers were introduced historically to be solutions to equations, rather than a means to a real solution. When reflecting on unexpected

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applications of imaginary numbers, he provides the unsatisfactory statements that “God in his wisdom made it so,” and that such numbers “are known by God,” making them “real.” Finally, on occasion in an argument, he has inserted the word “clearly” unnecessarily. For example, he brushes off a common inference as “clearly invalid” (p. 20); the adverb is either redundant or dismissive.

But these issues are minor and perhaps picky concerns. The bigger concern is with the overall argument itself. While I appreciate his anti-reductionist approach, allowing for the complexity and diversity of the created world, I do not find the analogical approach particularly convincing. In my opinion, it is applied too literally. And his oft-repeated refrain of thinking God’s thoughts muddles the distinction between God’s character and the specific way God upholds the creation, not to mention the particular ways that humans observe God’s handiwork. In the end, despite his intention, I find it hard to distinguish his position significantly from a Christianized Platonist approach. Nevertheless, Poythress provides food for thought for those exploring the relationship of faith and mathematics.

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WEAPONS OF MATH DESTRUCTION: How Big Data Increases Inequality and Threatens Democracy by Cathy O’Neil. New York: Crown, 2016. 218 pages, notes, index. Hardcover; \$26.00. ISBN: 9780553418811.

If you are looking for a dispassionate analysis of ethical issues in the use of big data, this book is not it. “Weapons of math destruction” (WMDs) are algorithms whose analyses of human data are used to make decisions that affect people’s lives in nefarious ways. O’Neil’s last chapter opens with the words, “As you know by now, I am outraged by all sorts of WMDs.” So why does O’Neil call some algorithms weapons of math destruction? And why is she so outraged by them?

Here is one of her examples. In 2009, Michelle Rhee was chancellor of Washington, DC’s public schools. She was appointed by a new mayor, Adrian Fenty, who wanted to improve the quality of DC’s schools. His plan was straightforward: “Evaluate the teachers. Get rid of the worst ones, and place the best ones where they can do the most good.” Rhee implemented a teacher assessment tool called IMPACT developed by a consultancy, Mathematics Policy Research, based in Princeton, NJ. It was a value-added model, measuring the educational progress

of students and calculating how much of that could be attributed to the teacher. In 2011, based on its results, 206 teachers were fired, an action which O’Neil regards as unjust. The algorithm was very complex—it took into account not only test scores but other factors as well, such as the presence or absence of learning disabilities and socio-economic background—but the algorithm was not available for review or critique. There were neither independent means to assess the accuracy or effectiveness of the tool nor any means of feedback by which it could be improved. The resulting assessment was based on a small sample, only the 25 or so students in a teacher’s class. And it was vulnerable to cheating. In the case of one fifth grade teacher who was fired, subsequent review of her students’ fourth grade assessment tests suggested that they might have been altered to make the fourth grade teachers look better.

So what makes algorithms WMDs? O’Neil focuses on several characteristics: they define their own reality and use it to justify their results; the underlying models are often opaque or even invisible to those affected by them; they tend to punish the poor; they may use sloppy statistics and biased models that create their own feedback loops; and they are unfair in that they may damage or destroy lives.

Here are two more examples: (1) Crime prediction software such as PredPol and CompStat, and (2) E-scores. These programs illustrate the feedback loop issue: more patrolling in a neighborhood creates more data fingering that neighborhood. They also illustrate the uneven treatment of the poor, as much of the data is for “nuisance crimes” included as relevant because of a purported link between antisocial behavior and crime; yet, the data exclude “white collar” crimes. Thus, the assessments contribute to a system of discrimination against the poor. In the second example, E-scores are scores rapidly computed online to evaluate potential customers. They take into account information such as web browsing history, purchasing patterns, and location of the visitor’s computer. Thus, for instance, at call centers e-scores are used to identify potentially more profitable prospects and funnel them to a human operator. But again there is a nasty feedback loop: people from poor neighborhoods get lower scores, and hence less personal attention, less credit, and higher interest rates. Predatory advertising is also generated through these scores.

Some further examples O’Neil addresses include recidivism models, risk models such as those used by hedge funds, the *US News* college rankings, personality tests sometimes in job application processes, automated resume reviews, use of behavioral data

in advertising, the algorithms used by Facebook to decide who gets to see one's posts, and more. She writes, "I am worried about the separation between technical models and real people, and about the moral repercussions of that separation (p. 48)." Hence, she identifies several sources of the problems that turn algorithms into WMDs. Models may encode human prejudice, misunderstanding, and bias into the software systems. Oftentimes, problems arise from the choice of goals, for example, desire for profit may far outweigh fairness. Many use proxies that are poor substitutes for the data one really wants but cannot measure directly. Opacity is often defended as "intellectual property." Software often does not get feedback on its performance.

O'Neil never plays the role of the neutral observer of algorithms for analyzing big data sets. Her passion for her message is explicit on every page (which for me, made reading her book somewhat exhausting). She does not pay much attention to the benefits these algorithms can provide. To her credit, however, she goes beyond analyzing the problems to propose and discuss solutions, including the use of some type of Hippocratic Oath for modelers, reevaluating metrics of success, identifying and eliminating unfair systems, incorporating positive feedback loops into models, requiring the auditing of algorithms, adapting and enforcing current laws, and requiring that models that have a significant impact on people's lives (e.g., those that assess credit ratings and e-scores) be open to the public and available.

The book is a must-read, I believe, for statisticians, operations researchers, managers of information systems, and anyone studying these fields. Relevant chapters should also be read by people working in or studying human resources, finance, educational assessment, criminal justice, and insurance. The book will also appeal to anyone interested in the impact of technology on culture.

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SHADOW OF OZ: Theistic Evolution and the Absent God by Wayne D. Rossiter. Eugene, OR: Pickwick Publications, 2015. Paperback; \$24.00. ISBN: 9781498220729.

This is an anti-evolutionary book that stands basically within the tradition of the modern intelligent design movement (e.g., Stephen Meyer, Discovery Institute). In particular, Wayne D. Rossiter attempts to argue that theistic evolution is not only scientifi-

cally vacuous, but more seriously it falls far short theologically. From his perspective, "there is no distinguishable difference between theistic evolutionism and atheism when it comes to our physical reality. Neither includes a God that is in any way *detectable* in his creation" (p. 25, my italics).

The notion of so-called "divine detectability" is a long-standing theme of the ID movement. To be more precise, Rossiter and ID theorists confidently proclaim that there are places in nature where God has miraculously intervened during the past. Rossiter openly states that he views God "as an active participant in his creation" and "an evidenced player in the workings of the universe" (p. 17). In appealing to scripture, Rossiter asserts, "In the Bible, God is clearly in the business of doing things that we would see in terms of manipulating physical laws and material quantities" (p. 115).

Of course, Rossiter's approach is another God-of-the-gaps view of divine action, and the history of science has repeatedly shown the failure of such attempts. The purported gaps in nature are, in fact, gaps in the scientific knowledge of those defending these anti-scientific and anti-evolutionary views of nature.

In his criticism of theistic evolution, Rossiter attempts to gather scientific arguments against biological evolution, but it is quite obvious that the foundation of his God-of-the-gaps thesis rests firmly on a concordist hermeneutic, not science. For example, he argues,

The word "kind" appears twelve times in the Genesis 1 account (NIV), and the phrase, "according to their kind"—plural—occurs eight times. Old Testament Jewish authors used such repetition for emphasis of important ideas. It was clearly important to indicate God *directly* made numerous kinds, and not just one. (p. 50, my italics)

However, Rossiter completely fails to appreciate that the category of "kinds" in Genesis 1 is an ancient taxonomical notion reflecting the common belief that living organisms were immutable and created *de novo*. To be more specific, this notion is rooted in an ancient phenomenological perspective. Evidence that Rossiter is completely unaware of the ancient scientific context of scripture appears when he states, "There is nothing in the Bible that teaches that we must see the Earth as the spatial center of creation, nor that the universe should be smaller than it is" (p. 59). It is well established within evangelical biblical scholarship that scripture features a three-tier universe (e.g., John Walton, Paul Seely, Peter Enns, Kenton Sparks, Kyle Greenwood). Christian astronomers today never appeal to this ancient cosmology in their daily work, nor should Christian biologists,

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such as Rossiter (he is a parasitologist), employ the ancient biology in the Bible to understand the origin of life.

To employ a term used by Rossiter, there are some statements in his book that are “patently false” (p. 17). He asserts in one place, “theistic evolutionists get their pantheism honest” (p. 20); and in another, “the basic view of theistic evolution is that of process theism” (p. 69). It is evident that Rossiter is completely unaware of the distinction between pantheism and panentheism.

In another patently false assertion, Rossiter asks, “What exactly does Jesus do in the theology of theistic evolution? Other than the satisfaction of knowing that the universe is created, their worldview seems to offer nothing different than that of secular atheism” (p. 85). Would Christian evolutionists of the American Scientific Affiliation or the BioLogos Foundation see their views as nothing but a form of secular atheism?

This is a deeply flawed book at many levels. But its greatest problem is that it conflates evolutionists of a wide range of theological/philosophical views into one category—theistic evolution. In this way, it collapses into one undifferentiated smudge conservative evangelical Christians (Francis Collins) with panentheists (John Haught), liberal Christians (Karl Giberson), and naturalists (Howard Van Till). I suspect that most evangelical Christians who accept evolution would be troubled (and maybe even insulted) with this conflation, as I was.

I do not recommend this book.

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PHILOSOPHY & THEOLOGY

DIGNITY AND DESTINY: Humanity in the Image of God by John F. Kilner. Grand Rapids, MI: Eerdmans, 2015. 402 pages, including bibliography and indices. Paperback; \$35.00. ISBN: 9780802867643.

What does it mean to say that human beings are created in God's image? This question has fascinated and puzzled biblical commentators and theologians for centuries. It has been of interest recently in pop culture as well, for instance, as one of the running themes of Darren Aronofsky's 2014 film *Noah*. The film juxtaposes two contested interpretations of the image of God, contrasting Noah's family on the one hand, whom God had charged with caring for the

earth and its inhabitants, with the villainous Tubalcain on the other, who believes that bearing God's image entitles him to seize, dominate, consume, and control.

Aronofsky's film vividly portrays the problem that John F. Kilner, Forman Chair of Christian Ethics and Theology at Trinity Evangelical Divinity School, seeks to address in his important new book, *Dignity and Destiny: Humanity in the Image of God*. Specifically, Kilner addresses the issue that has plagued numerous interpreters of the *imago Dei* through the ages: “Rather than people being in the image of God, God is remade in the image of people” (p. 50). This happens when interpreters define the image in terms of attributes that people presently possess. The reasoning seems natural to many: we humans are uniquely made in God's image, so we can unpack that image by looking at attributes uniquely characterizing human beings, and even come to a better understanding of God in the process. But this, says Kilner, reverses what the biblical authors understand the image to be and how they employ it throughout scripture.

The book is divided into three major parts. Part I addresses “The Human and Divine Context” and sets the stage by discussing the importance of the image of God, why interpreting it correctly is so crucial (and incorrectly so harmful), and the basic meaning of the term in the Bible. Part II is entitled “Human Dignity” and explores the image of God in light of its connection to the inalienable, God-given dignity that all human beings have by God's decree. Part III, “Human Destiny,” explores the renewal and consummation of the image of God in human beings, through their union with and transformation in Christ, who is the definitive and ultimate Image of God.

The book is comprehensive in gathering the scriptural and historical texts that directly reference the image of God. Four major themes are prominent. First, Kilner exposes the tendency of interpreters to view the image of God in terms of how people are presently like God, especially in terms of human attributes. (This charge is repeated many times, to the point of being repetitive.) At best, interpreters with this tendency are well intended but still misconstrue the biblical data while pursuing their own theological aims. At worst, this tendency leads to abuses of image language with horrific consequences, in support of discrimination (of the disabled, the mentally impaired, women, etc.), racism, colonialism, slavery, and genocide (see pp. 18–37). Such abuses ensue when interpreters first equate the image of God with certain human attributes, and then notice that these are diminished or absent in some people, leading to

the conclusion that the latter are not in God's image, or are so to a lesser degree than others, and thus are less worthy of dignity and rights.

Second, Kilner points out that the true, definitive, and ultimate image of God is Jesus Christ alone. Christ *IS* the image of God in terms of being an exact image-imprint of God. Humans, similarly but not exactly, are created "in" or "according to" the image of God, which is to say that they are created from the mold of the prototype (so to speak), Jesus Christ. Creation in the image of Christ implies both a status (due to a special connection with God) and a goal for humanity: "Christ's connection with God is one essential aspect of what it means for Christ to be God's image. Yet Christ's reflection of God demonstrates what God intends for humanity to be as well" (p. 72). Christ is the prototype (p. 80) and the standard (pp. 143, 145); he is the second Adam (p. 74), being both the exact imprint of God and yet also (according to Phil. 2:6-8) formed in the likeness of human beings (pp. 69-73). Since Jesus Christ is the image of God, Kilner stresses that it is improper to say that the image of God is ever lost, diminished, damaged, or destroyed. I return to and reflect critically on this point below.

Third, Kilner everywhere unpacks the basic meaning of the image of God in terms of a twofold definition: the image refers to (a) a special *connection* with God (a given status) that entails human dignity and (b) an intended *reflection* (a destiny or goal, intended, not necessarily actualized presently) that human beings are to be and become like Christ. As Kilner puts it, "It [the image] assures human dignity and sets the stage for human destiny" (p. 229). Kilner gives priority and prominence in the book to the first part of the definition (a). He likens the image to the doctrine of justification; as the latter concerns an objective reality (God's declaration that we are in the right), so the image of God is located objectively and, in a sense, simply declared and given. I wonder, however, if this is truly an apt analogy? Justification captures the first aspect of the image well (connection, status), but it fails to do justice to the second aspect (reflection, goal, task). Perhaps "salvation," more broadly conceived, provides a better analogy. Salvation has both objective and subjective components; it concerns both a given status (justification) and a call to participate by the Spirit in pursuing a goal or destiny (transformation into the image of Christ).

Fourth, the image of God is not lost or damaged in any way due to human sin and rebellion. Kilner makes this strong claim in a number of places in the book (e.g., pp. 93, 139, 141-42, 216). While it is true to say that *people* become corrupted, distorted,

damaged, diminished, and lost because of sin, Kilner argues that such cannot be said of God's image. Having surveyed all of the biblical texts that employ image-of-God language, he points out that the Bible never attributes distortion or diminishment to God's image, though it does attribute such to human persons. Rather, sin covers much of the evidence that human beings are made in God's image; it does not destroy that basic connection of all human beings to God.

Kilner's book exhibits several strengths. It offers a fresh exposition of the relevant biblical passages, in conversation with both contemporary biblical scholarship and with commentators and theologians of the past. It puts forth what I judge to be an important corrective to abuses of the term: insofar as the image of God refers to a connection with God and a status of having a God-given, inalienable dignity, we should avoid saying that God's image is ever lost, damaged, or destroyed. On the other hand, I think there needs to be an acknowledgment that insofar as the image refers to a calling and a destiny to be like God, with respect to our character and our vocation as God's representatives and stewards, the conclusion that the image of God can be diminished, and often is, remains sound.

Another strength is the recognition of development and destiny implied by the image of God. Our intended destiny as human beings involves much more than just a return to Eden. Something new, always intended by God, is taking place. The Incarnation, therefore, was not a secondary plan or new initiative on God's part in response to human sin, but necessary to the fulfillment of God's plan all along (with or without the Fall). This theme is relevant to contemporary scientific discussions about the nature, origins, and destiny of human beings and thus should be of great interest to readers of *PSCF* (the question of the historicity of Adam is never addressed, but it seems to be assumed by the author). Finally, the author's insistence that the image of God refers to human beings in their entirety (and not just to certain isolatable attributes) is important and can provide balance to lop-sided approaches to defining the image.

Some shortcomings of the book need to be mentioned as well. First, while the author cites many past and present theologians in the footnotes, there is little to no actual engagement with those theologians in the body of the text, no attempt to take the broader contexts of their writings into account (in terms of both historical context and the development of their arguments). This sometimes gives the book a "biblicist" feel. Eminent theologians through the

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ages—Irenaeus, Athanasius, the Cappadocians, Cyril of Alexandria, Augustine, Anselm, Aquinas, Luther, Calvin, Owen, Wesley, Barth, Brunner, Bonhoeffer, John Paul II, and many others—all get it wrong, whereas Kilner has gone back to the Bible to finally get it right. This raises suspicion.

Second, Kilner has the tendency to equate God's image with human dignity. While dignity is a legitimate theological implication of being created in God's image, it is neither the primary sense of the term nor is it even in view in most of the relevant biblical texts. In my estimation, Kilner has allowed Genesis 9:6 (NIV), "Whoever sheds human blood, by humans shall their blood be shed; for in the image of God has God made mankind," to overdetermine his interpretation of the image of God. He criticizes those that interpret the image in terms of rulership and representation (strangely and mistakenly referring to rulership as an "attribute," rather than a "calling" or "vocation"), because "rulership is not consistently present in other biblical passages about God's image" (p. 45). But this reveals three errors on Kilner's part: (1) one cannot simply determine the meaning of a word by reducing it to a lowest common denominator, such that it can only mean what it is associated with in every occurrence; (2) applying the same faulty criterion renders Kilner's own association of the image with dignity problematic, because this meaning is not itself present in every occurrence of image language in the Bible; and (3) Kilner does not sufficiently allow the historical (Ancient Near East) context and narrative flow of Genesis 1 to define the meaning of the image of God. This goes against the grain of Old Testament scholarship on Genesis 1 (e.g., Brueggemann, Clines, Longman, Merrill, Middleton, von Rad, Waltke, Walton) without adequate warrant. Kilner seems to read Genesis 9:6 into Genesis 1, again allowing it to overdetermine the meaning of the image.

This leads to a third problem in the book, which is that Kilner overstates the claim that the image of God is never damaged, diminished, corrupted, or lost. With respect to image as a status linked with basic human dignity (based on Gen. 9:6), there is some justification for the claim. But with respect to the image being a reflection, a goal, and a destiny, his assertion is too simplistic and becomes misleading and contradictory. Kilner himself writes,

People retain a special connection with God (though their relationship with God is badly damaged), and God still intends for people to reflect likenesses to God (though in actuality they largely fail to do so). (p. 134)

Kilner acknowledges that humans fail to reflect God's likeness but largely avoids the logical implication of this—that the image is thereby diminished in some sense—by conflating the two senses of image (as connection and/or reflection) and then arguing by equivocation.

Another way that Kilner attempts to make the claim that the image is never damaged is by pointing out that, properly speaking, Jesus Christ alone is God's image. While true in itself, Kilner draws from this observation a conclusion that does not follow. Yes, Jesus is God's image par excellence (Col. 1:15); it is precisely because of this that we are supposed to imitate Christ and grow into his likeness through our participation with/by the Spirit. We fail to do that, sometimes drastically so (e.g., think of Hitler and Stalin). How then can it be the case that the image remains uncorrupted in human beings, as Kilner claims? He evades this logical consequence by insisting that Jesus himself is the Image and Jesus is never corrupted (of course, all agree on this), but this again equivocates two senses of the image of God. Moreover, it makes his doctrine of the *imago Dei* seem almost Platonic, the Image operating like one of the forms: we are made according to the Image, in some vague sense we shadow it, and we are moving toward reflecting it fully (when we are glorified). But the Image itself [Christ] never changes; it remains totally Other. "People are in God's image—God's image is not in people" (p. 150).

Finally, Kilner nowhere defines what a human being is. Perhaps he thinks the answer is obvious and so a definition is unnecessary. But it seems to me that defining what it is to be human is at least as important as defining the *imago Dei*. One could theoretically agree with the author that the image of God is never damaged or diminished in humans but then still regard certain individuals, or whole groups of people, to be subhuman and thus exempt from image of God status (intact or not). To cite one of several examples, Kilner suggests that victims of the Nazi holocaust suffered the consequences of a distorted interpretation of the image of God (p. 311). While there may be a correlation at play here, Kilner overstates the causal connection and drastically oversimplifies the problem. At issue was not the definition of the image of God as such, but the failure to regard certain people (Jews, Gypsies, homosexuals, etc.) as fully human and thus entitled to *imago Dei* status.

Despite its shortcomings, Kilner's *Dignity and Destiny* is an important recent study of what it means to be created in/according to God's image. Widely refer-

encing biblical texts, touching on theological history, relevant to contemporary faith-science conversations about human origins and destiny, and passionately attuned to the importance of its subject matter for the oppressed and the vulnerable, it deserves a wide readership.

Reviewed by Patrick S. Franklin, Associate Professor of Theology and Ethics, Providence Seminary, Otterburne, MB R0A 1G0.

BEING HUMAN, BEING CHURCH: The Significance of Theological Anthropology for Ecclesiology by Patrick S. Franklin. Carlisle, UK: Paternoster, 2016. 325 pages. Paperback; \$49.99. ISBN: 9781842278420.

The theme of this book is that a theologically adequate doctrine of the church presupposes an equally adequate doctrine of the human person. The meaning of being human has a decisive bearing on the meaning of being church. This insight alone makes an important contribution to the contemporary discussion about the nature and mission of the church, no matter which part of the ecumenical mansion happens to be one's home. Patrick Franklin's aim is to develop a holistic view of the human person that is theologically more satisfying than all the competing models he describes.

To develop an adequate theological anthropology the author draws heavily from the works of contemporary theologians who have contributed to a renewal of the doctrine of the Trinity, most notably Wolfhart Pannenberg, Jürgen Moltmann, John D. Zizioulas, Colin Gunton, Miroslav Volf, and Catherine LaCugna. Surprisingly absent from this list is the name of Robert W. Jenson, American Lutheran theologian, who has written more extensively and creatively on the Trinity than most of the others.

Franklin writes from the perspective of an evangelical theologian, affiliated with the Baptist tradition. He agrees with the charge that historically Evangelicalism has lacked a coherent ecclesiology; in this book, Franklin rises to the challenge to demonstrate that Evangelicalism has the resources within its tradition to compensate for this deficit. In doing so, he cites a number of his fellow evangelical theologians who have written books on ecclesiology from a Trinitarian perspective, in particular Stanley Grenz and Miroslav Volf. Both of these have reached considerably beyond Evangelicalism to enrich their thinking about the church. As for the author himself, he cites the works of Dietrich Bonhoeffer more often than any others. Bonhoeffer's dissertation on the church, *Sanctorum Communio*, which Karl Barth called a "theological miracle," is accorded a place of preeminent significance.

Franklin writes that evangelical ecclesiological imagination must expand and deepen. That is true not only for evangelical theologians but for all of us in different regions of the worldwide church. Our thinking about the church has been too small. What is the best strategy to expand and deepen our ecclesial imagination? Franklin gives it an injection of Bonhoeffer and others. Is that sufficient? I do not think so. What is missing is a broader ecumenical perspective that takes seriously more of the Eastern Orthodox, Roman Catholic, and Anglican theological traditions whose strong suit is and has always been ecclesiology. Granted, Pannenberg and Moltmann are both ecumenical theologians who have invested a lot of thought in doing just that. Pannenberg especially has been at the forefront of ecumenical dialogue, a leader in Faith and Order and a member of the Catholic-Lutheran Dialogue, both of which rank ecclesiology as a topic of highest importance.

Franklin's book on the nature of being human and its relation to the nature and mission of the church is a worthy gift to the ecumenical quest for a deeper and broader ecclesiology whose goal is to restore unity to a badly divided Christian world. To give one example, Franklin strongly emphasizes that the worldwide apostolic mission of the gospel of Jesus Christ is part of the essence of the church, a theme not always front and center in the majority of books on ecclesiology that are preoccupied with institutional questions of order. Readers would do well to receive with gratitude the insights Franklin's book offers their own search for a richer understanding of the church.

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SCIENCE & BIBLICAL STUDIES

SCRIPTURE AND COSMOLOGY: Reading the Bible between the Ancient World and Modern Science by Kyle Greenwood. Downers Grove, IL: IVP Academic, 2015. 251 pages. Paperback; \$24.00. ISBN: 9780830840786.

Kyle Greenwood's *Scripture and Cosmology* helpfully introduces nonspecialists to biblical cosmology in the context of the ancient world and shows how Christians in the medieval and early modern periods who were committed to biblical authority had to adapt their interpretation of scripture in the light of what they were learning from science. Following a brief introduction (chap. 1, "Scripture in Context"), *Scripture and Cosmology* is organized into three main parts.

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In Part 1, "Scripture and Cosmos in Cultural Context," Greenwood takes the reader on a tour of "Ancient Near Eastern Cosmologies" (chap. 2), exhibiting how Israel's neighbors thought of the structure and nature of the cosmos. Drawing on a variety of ancient writings, carvings, and drawings to illustrate his analysis, Greenwood shows that the cosmos was consistently pictured on the model of a building. In particular, he sketches the common idea of the cosmos as tripartite, consisting of the heavens (above), the earth (as a flat land mass), and the sea (beneath and around the earth, usually thought of as a single cosmic ocean or deep).

In "Cosmology in Scripture" (chap. 3), Greenwood goes on to demonstrate how the same basic ideas show up in the Old Testament. Using a variety of biblical texts, Greenwood shows that the writers of scripture thought of the heavens as either a solid, dome-shaped structure overhead (the "firmament") or a taut tent that God stretched out (tents were more stable structures in the ancient world than we usually imagine). In either case, the heavens functioned as the roof of the world, serving to hold back the upper cosmic waters. The heavenly bodies—sun, moon, and stars—were fixed in the firmament and below it were birds and clouds, while God's throne was typically located above or upon the firmament. Greenwood thus distinguishes the "upper heavens," the realm of God and angels, from the "lower heavens," which included ordinary celestial phenomena, with the firmament in between. The heavens were supported by the distant mountains at the extremities of the earth, the roots of which went down into the subterranean waters; thus, the mountains also functioned as the foundations or pillars of the earth, which explained why it did not sink into the waters.

In chapter 4, "Cosmology and Cosmogony in Scripture," Greenwood endeavors to illustrate the pervasiveness of this understanding of the cosmos by drawing together a variety of creation texts from the Old Testament. His lucid analysis of the different creation accounts in Genesis 1 and 2 is especially helpful for anyone new to biblical studies, but his choice of other texts did not always seem intuitive (I could think of better ones), and the extreme brevity of his comments in some cases made me doubt the value of parts of this chapter. Yet Greenwood makes the important point that Genesis 1 is the only Old Testament creation account in which the idea of creation over six days is mentioned. And he wryly notes that while the Genesis flood is, indeed, worldwide (covering the known world), it is not technically "global," since the earth was not considered a globe.

While there is little new in Part 1 for biblical scholars (this is all widely agreed on), Greenwood goes on in Part 2, "Cosmology and Scripture in Historical Context," to narrate post-biblical changes in the accepted cosmology of Western culture, beginning with the shift from the ancient Near Eastern conception of a flat earth to the spherical earth introduced by the Greeks. In chapter 5, "Scripture and Aristotelian Cosmology," we find a helpful sketch of the contributions of Aristotle and Ptolemy to the development of the idea of a spherical earth at the center of the cosmos, around which revolved seven concentric spheres (seven heavens), in which the sun, moon, and five planets were embedded, with God's throne/dwelling beyond that. This new cosmology, which greatly expanded the imagined size of the cosmos, also included the Platonic idea of a corruptible sublunar realm, with everything beyond the moon being incorruptible (the circular motion of the sun, moon, and planets was thought to embody perfection).

Once this new cosmology became dominant in the church, it required some reinterpretation to harmonize it with the biblical world picture. In a fascinating account of how Augustine, Aquinas, Calvin, and Luther among others struggled to adapt the biblical picture to the new cosmology, Greenwood discusses the reinterpretation necessary for the "firmament," the waters above the firmament, the ends or corners of the earth, the "foundations" of the earth, and the nature of the underworld (Sheol/Hades)—to name just some of the ideas found in the Bible. Two examples of reinterpretation will suffice. Since the firmament could no longer be the dome in which the sun, moon, planets, and stars were embedded (they were not equidistant from the earth according to the new cosmology), it was now interpreted as the boundary of the seventh heaven, beyond which was the realm of God. The idea of a spherical earth resting on "foundations" was transformed into a metaphor for affirming that God kept the earth stable, without imagining literal pillars going down into the deep.

In chapter 6, "Scripture and Copernican Cosmology," Greenwood discusses the contributions of Copernicus, Galileo, and Kepler, whose work led to the heliocentric conception of the cosmos. In the remainder of the chapter, Greenwood focuses on the reception of Copernican cosmology by the Roman Catholic church, which was wedded to the Aristotelian view of the cosmos, and on ways in which Galileo, then later Luther and Calvin, tried to address the discrepancies between the Bible and the new cosmology. While the opposition of the Catholic church and Galileo's trial (then later inquisition)

are well known, it was instructive to read about the responses of the Protestant reformers, who had already worked at reconciling biblical cosmology with the Aristotelian view. Living so close to the rise of heliocentrism, they struggled to affirm the truth of the new cosmology and the teachings of the Bible, for example, how to affirm the nature of the sun and moon as “lights,” given that the moon was not technically its own light source.

In Part 3, “Scripture and Science,” Greenwood first (chap. 7, “Cosmology and the Authority of Scripture”) develops Calvin’s doctrine of divine accommodation to account for the disjunction between biblical cosmology, which utilizes ancient Near Eastern ideas as a vehicle for revealed truth, and our changing scientific understanding of the cosmos. Then, in chapter 8, “The Authority of Scripture and the Issue of Science,” he uses the example of medicine to show the value of going beyond the “scientific” ideas assumed in the Bible, and then returns to how various Christian and Jewish theologians throughout history related the science of their day to biblical truth. He concludes with famous words from Charles Hodge and Augustine about respecting what experts in science tell us about the world instead of trying to make scripture speak authoritatively on that subject.

Since Greenwood’s book is so helpful in what it accomplishes, I hesitate to raise criticisms or caveats. But a few are in order. First, Greenwood uses the term “worldview” as equivalent to cosmology, which is confusing and bypasses the immense literature on worldviews that has developed in the past half century. It would have been helpful if he had distinguished the *world picture* (German: *Weltbild*) or cosmology that the Bible assumes from its normative *worldview* (German: *Weltanschauung*), the distinctive and abiding theological vision that God was revealing precisely through this ancient world picture. The biblical writers were using an ancient cosmology to communicate a normative worldview meant to orient us to the ultimate meaning of this world.

One caveat that should be noted is that the ancient Israelites did not distinguish the upper heavens, the realm of God and the angels (pp. 85–89), from the lower heavens, the realm of birds, clouds, and celestial bodies (pp. 89–94), quite so clearly as Greenwood does (the terminology of “upper” and “lower” heavens is not actually biblical). True, Job 22:14 says that God walks on “the dome of the heavens” and God’s throne is sometimes pictured as resting upon the firmament, which is sapphire/blue in color (Exod. 24:10; Ezek. 1:26). Yet Psalm 104:2–4 envisions God dwelling in the heavenly tent he has spread out,

and he is portrayed as clothed in the light of the sun, with the winds and lightning as his servants—thus mixing phenomena from the so-called upper and lower heavens. This mixing is further evident in various biblical texts that identify stars with angels (Job 38:7; Judg. 5:20) and by the use of “the host of heaven” to refer variously to angels (1 Kings 22:19; Ps. 103:20–21), stars (Ps. 33:6; Isa. 40:26), or false gods (2 Kings 17:16; Isa. 24:21). In general, God is simply said to dwell “in” the heavens, which is a symbol for God’s transcendence, since the sky above is generally inaccessible to us; but it is also a symbol of God’s immanence, since God has chosen to dwell within the cosmos he created.

A second caveat would be that while the tripartite cosmos—heaven, earth, sea or underworld—is often in evidence in the Old Testament as Greenwood notes, Jonathan Pennington’s *Heaven and Earth in the Gospel of Matthew* (Baker Academic, 2009) has decisively shown that this three-fold division is typically a function of a more fundamental bipartite conception of “heaven and earth” with the sea or the underworld as a subcategory of the earth. This is evident in the merism “heaven and earth” (Gen. 1:1 and 2:1), which signifies the entire cosmos. Thus, while Greenwood cites some New Testament texts that assume a tripartite cosmos (Phil. 2:10), others portray the cosmos as clearly bipartite (Matt. 6:10; Col. 1:16, 20; Eph. 1:10).

But perhaps my major substantial criticism would be that Part 2, “Cosmology and Scripture in Historical Context,” ends too early, with the Copernican revolution. Even the chapter on modern cosmology feels unfinished; Greenwood just begins to discuss how Christians at the start of the modern period tried to relate biblical cosmology to the new scientific world picture. Minimally, this chapter needs some analysis of how “heaven” came to be understood as God’s immaterial dimension (the way most Christians think of it today). This modern conception of heaven seems to have been motivated by the new ability to look at the night sky through telescopes; if God was not literally located somewhere “out there” in the cosmos (which made no literal sense), then “where” was he? To solve this conundrum, theologians were able to draw on the classical metaphysical notion of immaterial reality inherited from Neoplatonism, which was applied not just to God, but also to God’s realm (“heaven”), thus generating the quite unbiblical idea that heaven is uncreated.

Also, it would have been extremely helpful if Part 2, “Cosmology and Scripture in Historical Context,” had included a chapter on more-recent scientific

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changes to our world picture, such as the Big Bang and a universe of billions of galaxies expanding and accelerating away from each other. Some reflection on how Christians have tried to connect this new cosmology to the Bible would be fascinating.

Finally, there were a number of proofreading or copy editing issues with the book. Thus “more temporary structure” on page 82 should actually be “more permanent structure”; here Greenwood is describing two metaphors that biblical writers used to describe the ceiling of the world: “One appealed to their nomadic past using tent imagery. The other employs the imagery of a more temporary structure.” Then, at the bottom of page 163, “sun” and “earth” are reversed: Copernicus did not shift “the center of movement from the sun to the earth,” but vice versa.

More confusing is that the term “hendiadys,” used twice on page 86. It should be “merism,” although technically a merism is a contrasting pair meant to include everything in between. Here “hendiadys” is used as a comprehensive list of items—five in one case (Ezek. 38:20) and three in the other (Zeph. 1:3).

But these are small details and do not really detract from a most helpful volume.

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SCIENCE AND RELIGION

FAITH AND WISDOM IN SCIENCE by Tom McLeish. Oxford, UK: Oxford University Press, 2014. 304 pages. Hardcover; \$32.95. ISBN: 9780198702610.

This is the best book I have read all year, and the best I would expect to read for a long time to come. It is a superbly crafted exploration of the relationship between science and faith (yes, another one of those, but stay with me a bit!) by an author deeply conversant with both topics. He is wise enough to discern the foundations on which both enterprises rest, humble enough to offer his observations without offense, and literate enough to do so in a marvelously well-written text. The book flows smoothly from one difficult topic to another, erudite but not showy, scholarly but not dense, bold but not brash.

Tom McLeish is Professor of Physics and, until recently, Pro-Vice-Chancellor for Research at Durham University in the United Kingdom. His specialty is the molecular theory of complex fluid flow, and stories from his own collaborative research find their way into the text. He is a public intellectual, drawing on his academic reputation to influence

policy decisions regarding science. He is a Fellow of esteemed professional organizations, including the Royal Society. And he is also a Christian. He does not explicitly state that in this book, but his ruminations on scripture are not merely theoretical; they are also devotional. He writes of both faith and science as an insider, as one with investment and commitment to the enterprises they represent and the assumptions on which they are founded.

McLeish would have us do away with any notion that theology and science are distinct entities; he wishes to delete the “and” between those two words and substitute “of.” He illustrates and initiates this agenda by proposing his own rudimentary theology of science, rooted in love.

McLeish is a story teller. He arrives eventually, in his penultimate chapter, at this theology of science by way of a series of small narratives, beginning with stories of natural philosophy, the love of wisdom in nature, which was what science was called before that word was invented in the early nineteenth century. The love of wisdom is a trait that both people of faith and people of science share, for example, Robert Brown (for whom Brownian motion is named), the thirteenth-century Bishop of Lincoln, the seventh-century Venerable Bede, and Macrina, the theologian sister of the fourth-century Cappadocian Fathers. These are fascinating and penetrating vignettes surveyed in chapter 2.

In chapter 3 he explores natural wisdom in the Old Testament, particularly in its multiple creation narratives in the Proverbs, Psalms, prophets, and, of course, Genesis. (A reader might be surprised to discover that the Jewish scriptures contain more than one, or even two, treatments of the origins of the natural world.) This culminates with a marvelous exegesis of the oldest and murkiest wisdom literature of the Jewish/Christian scriptures: the Book of Job. McLeish explores the story of Job through the lens of order and chaos in the natural world—how this is interpreted by his friends, by Job himself, and finally by the Lord speaking from a whirlwind. He then moves to the New Testament explorations of the meaning of the natural world, particularly as found in the themes of creation and reconciliation (to which he later returns).

His purpose in this highly informed biblical survey is to illustrate that the enduring questions of natural philosophy are rooted deeply in the pain and passion of human experience, and therefore they do not belong solely to the rationality of modern science. And science itself is not as rational, orderly, or methodical as its champions sometimes insist:

Science runs far deeper, quirkier and at more fully human levels than we would think from stories of relentless discoveries, spectacular phenomena or the cool application of a fixed methodology. We know better than to swallow an inadequate narrative that portrays science as simply replacing an ancient world of myth and superstition with a modern one of fact and comprehension. Science, as we have framed it with a broader and older “love of wisdom of natural things,” does indeed call on a growing illumination of nature of experiment and imagination, creating understanding where there was none before and opening up the exploration of new phenomena ... But science also emerges from an ancient longing, and from an older narrative of our complex relationship with the natural world. Its primary creative grammar is the question, rather than the answer. Its primary energy is imagination rather than fact. Its primary experience is more typically trial than triumph. (p. 102)

How, then, do science and faith relate? He suggests that there have been three distinct approaches to their relationship, all of which he finds inadequate. The first is to declare them competitors in the search for ultimate explanations about the nature and meaning of the universe. This is the approach favored by the “new atheists” such as Richard Dawkins and also by religious fundamentalists. He finds that in such a “conflict” approach both parties tend to be triumphalist about their own truth claims and both tend to misrepresent the aims and assumptions of the other.

A second approach is to divide faith and science into two entirely different fields of inquiry, and then to call offside when one encroaches on the other’s territory. This is the “non-overlapping magisteria” option of Stephen Jay Gould. McLeish finds this overly limiting on both sides, as science must concern itself with matters of values, for instance, and, as his biblical overview repeatedly acknowledges, faith observes and probes the behaviors of the natural world.

A third approach “attempts reconciliation by comparative methodology, while keeping the objects of enquiry distinct” (p. 169). He specifically acknowledges the work of physicist-priest John Polkinghorne here, who has explicated on numerous occasions the overlapping epistemologies and methods of science and theology. McLeish suggests, though, that this has the effect of “reducing the universal scope of both narratives” (p. 169), and thus diminishes both.

His alternative is to offer his theology of science (he suggests that we would also benefit from a science of theology), and delineates some “common threads” from both narratives, including love, manifested in a mutual commitment to the task of reconciliation.

He writes,

Science becomes, with a Christian theology, the grounded outworking of the “ministry of reconciliation” between humankind and the world. Far from being a task that threatens to derail the narrative of salvation, it actually participates within it. Science is the name we now give to the deeply human, profoundly theological task of participating in the mending of our relationship with nature. (p. 209)

McLeish concludes with a chapter on “mending our ways,” intended to offer practical suggestions on how to live out the relationship between science and faith that he offers here. In a brief epilogue he suggests that the New Testament story of conversation between Jesus and a Roman centurion can inculcate and elucidate the trust required to honor the respective authority found in each of these two enterprises.

It is doubtful that many scientists would instinctively understand themselves as philosophers of wisdom, as McLeish would have them do, much less agree that reconciliation is a primary object of their work. But what if they did? How could the relationship between humans and the natural world be transformed? And what if Christians were to perceive science as a vital aspect of our very human grappling with the questions generated by both the order and chaos of the material universe? What if we were to understand science as a source of wisdom and not merely as an object of contention? These hopes are addressed repeatedly in this journal on science and the Christian faith. If nothing else, perhaps McLeish has given us an opportunity to occasionally replace the “and” in such discussions with an “in.”

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THE TRUTH ABOUT SCIENCE AND RELIGION: From the Big Bang to Neuroscience by Fraser Fleming. Eugene, OR: Wipf and Stock, 2016. 221 + xvii pages, including bibliography and index. Paperback; \$29.00. ISBN: 9781498223294.

The Truth about Science and Religion: From the Big Bang to Neuroscience is a literary buffet serving a bit of everything related to science and faith. Interested in a bit of cosmology, biology, history, philosophy, with a splash of theology? You have found the book for you. Fraser Fleming, a professor and Head of the Department of Chemistry at Drexel University in Philadelphia, writes in a subtle way about science and religion while treating them equally and respectfully. I waited patiently through the 221 pages for a sentence that began with “The truth about science

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and religion is ...” but of course this sentence never came. Instead, Fleming seems to let readers make that conclusion on their own.

The Truth about Science and Religion is based on Fleming’s own personal notes and reflections that have withstood the critiques of colleagues, editors, and students in his classes. I see this book as being of particular interest to those in the latter category. Students, and seekers in general, will benefit from the broad overview and discussion of numerous topics at the intersection of faith and science. In addition, the discussion questions and the reading suggestions at the end of each chapter are excellent inclusions for a reader who may want more. This book is not written for someone who wants an in-depth discussion of faith and a particular scientific field; rather, it is for someone who wants a bit of everything. I think this book accomplishes what Fleming states in the introduction:

This book is intended to stimulate personal reflection more than provide an intellectual exercise, furnishing knowledge for personal reflection that in turn challenges core beliefs and provokes changes in behavior. (p. xvii)

After a brief introduction, the book is divided into eight chapters and concludes with an epilogue. I appreciate the chronological organization, from explorations of the Big Bang through to the evolution of *Homo sapiens* and our pursuit of science and purpose. Chapters 1 through 4 discuss the formation of the planet and people prior to Jesus. I appreciate the mix of physics, chemistry, and biology in these chapters. However, I must point out a few biological overgeneralizations. One example is the characterization of all macromolecules as polymers (p. 39). While it is true that nucleic acids, proteins, and carbohydrates are polymers, lipids often lack similar repeating units and thus are not polymers. Another biological error is the statement that the Golgi apparatus synthesizes proteins (p. 40). While the Golgi can modify and sort proteins, ribosomes synthesize them. These small overgeneralizations are easily forgotten as the reader finds beautiful poetic sentences such as “Plants and animals whose skeletons become compressed in sandy sediment create a book whose pages are read by sequentially dating each individual layer” (p. 58).

Chapters 5 through 7 focus on Jesus and the science and religion debate that ensued throughout history. Chapter 5 stood out from the rest of the book as it told the story of salvation and divine power from a scientific standpoint with references to things such as chromosomes (p. 95), wave amplification (pp. 100–101), chaos theory (pp. 105–6), and atoms (p. 110).

Chapter 6 is by far the longest chapter of the book, and tells of the complex relationship between science and religion throughout history, beginning with the Egyptians and Babylonians. It is always encouraging to read of the times when the two had, and can continue to have, a mutually beneficial interaction. The subsequent discussion focuses on the organ which gives us the intelligence to pursue such scientific endeavors, the brain. I thought that this chapter offered particularly insightful reflection on the confusing link between the brain, mind, and soul.

The last chapter (8) ends the book on an appropriate note, a discussion of the meeting and relevance of science and faith. Fleming subtly nods toward the general theme of his writing: science points out that the “universe seems endowed with a weighed beneficence” (p. 203). Fleming writes in the epilogue that he looks retrospectively at chance events, both throughout evolutionary history and in his own life, and sees God at work. He sees chance as providential. A scientist may look at the remarkable formation of the universe, macromolecules, cells, and higher cognitive beings and see nothing but chance and luck. In contrast, someone looking from both the science and faith perspectives will see God at work in those improbable and somewhat miraculous events.

Throughout *The Truth about Science and Faith*, Fleming draws interesting parallels between the microscopic and the macroscopic. Firstly, he mentions that humans are perfectly positioned to study both as we are at the approximate mean size between the universe and the atom (p. 9). Secondly, Fleming states that there are approximately the same number of stars in the Milky Way galaxy as there are cells in the human brain (p. 171). At first glance these parallels are interesting, but at second glance I realized the awe-inspiring nature of those statements. Is it by divine providence that we are at the perfect size to look both outward at the billions of stars in our galaxy and inward to the billions of cells in our brains? What a beautiful creation awaits our scientific study!

Reviewed by Rebecca Dielschneider, Assistant Professor of Biology, Providence University College, Otterburne, MB R0A 1G0. ♦

As space permits, *PSCF* plans to list recently published books and peer-reviewed articles related to science and Christian faith that are written by our members and brought to our attention. To let us know of such works, please write to patrick.franklin@prov.ca.
