

Book Reviews



ENVIRONMENT

ENVIRONMENTAL SCIENCE AND THEOLOGY IN DIALOGUE by Russell A. Butkus and Steven A. Kolmes. Maryknoll, NY: Orbis Books, 2011. vii + 244 pages. Paperback; \$26.00. ISBN: 9781570759123.

A cursory glance at the cover of this book might lead a casual reader to believe that it consists of a dialogue between two authors who are trying to understand each other better. It is not. Rather, Butkus and Kolmes write with one voice to try to persuade readers that “ecologically unsustainable human conduct threatens future human and non-human generations” (p. 3), but “broken relationships [namely, human/human, human/Earth, human/God] can be healed and restored and that a sustainable future is achievable *if* we are willing to engage in the practice of right relationships required for the planet and all its inhabitants to flourish” (p. 4, emphasis in original). They proceed to describe how they think science and theology should play roles in this process of healing and restoring the global ecosystem. Their book is not the first to present theological views on environmental issues, but in contrast to anthologies of primary documents or essays that focus on one discipline or the other, it attempts to present science and theology as allies in the pursuit of sustainability. To the extent that it facilitates dialogue, the book presents the scientific content in a way that theologians can understand and the theological content in a way that scientists can understand.

Butkus, a Roman Catholic who is associate professor of theology and environmental studies at the University of Portland, Oregon, and Kolmes, an Episcopalian who holds the Molter Chair in Science (biology) at the University of Portland, have organized their book into eight chapters, each of which consists of text, questions for discussion, active learning exercises, and recommended reading. The book also has a companion website. Endnotes for the chapters are compiled in the back of the book, along with a glossary and index. These features are intended to facilitate its adoption for college courses.

The content includes an overview of Christian theology’s engagement with culture in general and with environmental issues in particular (chapter one), twentieth-century developments (chapter two), ecological processes in relation to environmental science (chapter three), the impact of people on ecological processes (chapter four), the effects of toxins on children (chapter five), what ecology tells us about God (chapter six), what God tells us about ecology (chapter seven), and sustainability (chapter eight). The authors’ accounts of these topics are not intended to be exhaustive but are intended to be sufficiently comprehensive to familiarize the reader with the topics and some of the leading resources surrounding them. The authors mostly accomplished their goal. They also effectively described a cyclic “iterative-praxiological” method for addressing complex problems (pp. 42–5).

Not surprisingly, given the authors’ backgrounds, the theological reflections presented in the book come from the Christian tradition, albeit only from those perspectives that offer support for their thesis (neither Francis Schaeffer

nor Calvin DeWitt makes an appearance, for instance). A particular strength of the book is how the authors describe the selected theological contributions to the dialogue over environmental issues within the context of process theology. On the other hand, many Christians would regard process theology, as well as liberation theology and feminist theology, as outside the realm of orthodoxy. Furthermore, the focus of chapter seven is on the models of Jay McDaniel, Sallie McFague, and Denis Edwards, all of which the authors identify as panentheistic models.

One of the weaknesses of the book stems from the very approach of the book itself. The authors make the case that the field of environmental studies is not merely multidisciplinary or interdisciplinary, but transdisciplinary. They, however, then emphasize only two disciplines. I wholeheartedly agree that theology needs to be part of the conversation if meaningful solutions to environmental problems are to be reached. The omission of such disciplines as economics and political science, though, causes some of the authors’ proposals to appear simplistic or naïve. For example, their discussion of sustainability in chapter eight does not address the differences between enacting public policy in a constitutional republic versus in a parliamentary democracy or under an authoritarian regime.

Another weakness of the book is that the authors do not explicitly define what they mean by the terms “ecjustice” or “social justice.” Unfortunately, such terms mean different things to different people and are not self-evident. The implication is that ecjustice will obtain when sustainability is achieved. Sustainability, however, is an inherently anthropocentric idea. Must ecjustice accommodate anthropocentric goals? Are ecjustice and social justice necessarily mutually compatible? It would be enormously helpful if the authors would define these terms in future editions.

With respect to the coverage of scientific information in chapter four, the authors mention the difference in potency between methane and carbon dioxide (p. 76), but they do not mention the difference in longevity in the atmosphere between those greenhouse gases or the concept of carbon dioxide equivalents. I found their description of the feedback loop involving decreased albedo and increased water evaporation (p. 77) to be over simplified. Their decision to relabel such positive feedback loops as “destructive” (and corresponding negative feedback loops as “constructive”) is helpful, however. Later in the chapter, they charge that “climate change ‘skeptics’ funded by corporate entities ... have spread misinformation” (p. 82). Honesty and fairness would seem to demand an acknowledgment that climate change “heralds” also have powerful financial incentives to promote their findings. Skeptics do not have a monopoly on sinful behavior. The authors do not in any way address the so-called “Climategate” emails. No mention is made of developments in the areas of either green chemistry or green engineering.

The writing style is appropriate for undergraduate students and other nonspecialists. The editing of the book is very good. I counted only five errors, and none of the errors obscures or distorts the intended meaning.

Because of the process theology and panentheistic models presented, I cannot recommend this book for Christians who are just beginning to shape their views on environmental issues. I do recommend that instructors in environmental studies programs at the college or university level consider adopting this book for their courses.

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ETHICS

MERCHANTS OF DOUBT: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming by Naomi Oreskes and Erik M. Conway. New York: Bloomsbury Press, 2010. 355 pages, notes, index. Hardcover; \$27.00. ISBN: 9781596916104.

Merchants of Doubt affected me more than most books. Everyone who cares about truth and public policy should read it, but especially people like me who are naïve enough to think (or now, to have thought!) that prominent scientists will not use their credentials to mislead people on scientific questions. Over the last thirty or so years, the counterexamples to such a high view of prominent scientists have been few, but the scientific stature, political skills, and financial resources available to the subjects of this book have compensated for their small numbers.

Oreskes, a professor of history and science studies at the University of California San Diego, and Conway, a science journalist, matter-of-factly document (with over one thousand endnotes) and analyze how four prominent scientists have helped to counter reliable scientific results and confuse the public on six important issues, beginning with the connection between cigarette smoke and lung disease. The other issues are acid rain, the ozone problem, second-hand smoke, the Strategic Defense Initiative (Star Wars), and human-caused (anthropogenic) climate change. What follows is a brief review, which barely scratches the surface of the four's activities.

The central character in this drama until he died in 2008 was Frederick Seitz. Others who worked with Seitz and played prominent rolls in the story included former Director of Scripps Institution of Oceanography William Nierenberg, astrophysicist and one-time American Association for the Advancement of Science (AAAS) President Robert Jastrow, and physicist and science administrator Fred Singer.

I have personal connections to the story. As a physics graduate student at the University of Illinois in 1983 (a department Seitz once chaired), I heard that people dated modern solid state physics to Seitz and three colleagues (the group won three Nobel prizes). Seitz was highly regarded by other scientists, evidenced by his election as president of the National Academy of Sciences. This impacted me. Because I was aware of his outsized scientific accomplishments, Seitz's public skepticism of the evidence for climate change (known then as global warming) in the 1990s caused me to doubt, to some degree, my best-informed colleagues' opinions and what was, even then, scientific consensus concerning the reality and risks of climate change.

But Seitz had a darker side, unknown to me. From Oreskes and Conway, I learned that in 1979, upon retirement, he went to work for R. J. Reynolds where he supported the tobacco industry's efforts to challenge the connection between smoking and lung disease. He dispensed \$45 million in research grants over six years to scientists who, in the words of tobacco industry documents, "produced a number of authorities upon whom the industry could draw for expert testimony in court suits and hearings by government bodies" (p. 29). Later, in 1989, Seitz advised them on how to fight evidence of secondhand smoke's harm, coordinating an internal report which acknowledged the abundant evidence of harm, but advised the industry on how to fight regulation (p. 142).

The tobacco industry's (and Seitz's) effort to subvert science was a precursor to how Seitz and his colleagues would assist other industries for which scientific results threatened regulation. A tobacco executive's apt summary, "Doubt is our product since it is the best means of competing with the 'body of fact' that exists in the minds of the general public" (p. 34), also summarized later efforts.

The Doubt Strategy

The strategy that Seitz and others followed in supporting these questionable causes was to avoid the practice of science. Science's backbone is the practice of presenting empirical results to a competent community which has the skills to understand, assess, and challenge the results. In contrast, Seitz and the company's game plan was to have eminent scientists (themselves) bypass the scientific community's competent scrutiny and go directly to the public, creating the appearance of science while avoiding its practice. Too often, the game plan included deceit. The "go to the public strategy" involved multiple approaches (more than can be documented in a short review).

The first approach, practiced most effectively by Singer, was to make broad general claims of "bad science" or "junk science," or to allege political influence in op-eds or press releases in which evidence to support their claims was unnecessary. Such actions were effective. They received immediate press and left the layperson with the hard-to-overcome impression that the scientific community was significantly divided. Furthermore, in contrast to specific claims that science investigates (e.g., historical CO₂ concentrations, temperature changes, etc.), general claims of "bad science" are essentially impossible to refute, particularly when made in a public medium.

At issue here is the effort to avoid a competent audience. When the tobacco industry argued that the public should "be allowed to make its own decisions based on the evidence" (p. 32), what they really sought was to have the issue decided, but not by people who understood enough science to be competent judges.

A second approach to bypass science was to author privately produced articles, not subject to peer review, but still widely cited because of the authors' impressive scientific credentials. One article, notable for what it revealed about Seitz, Nierenberg, and Jastrow, was produced by the George C. Marshall Institute in 1989. The

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article's central claim was that the warming that climate scientist James Hansen and others had found did not track the historical increase in CO₂, and thus the observed warming "must have been caused by the Sun" (p. 186). Their conclusion was wrong—warming does track CO₂ as well as other factors, including the sun. But what is most striking was the ham-handed way these eminent scientists supported their position. Like a dishonest student, they reproduced a Hansen figure with five of the figure's six plots edited out to give the misleading impression that Hansen's data supported them (p. 187).

Seitz also used the private article approach in a letter he wrote inviting recipients to sign a petition opposing the Kyoto Protocol. The letter enclosed an "article" published by a chemist, Arthur Robinson, and formatted to look like a reprint from the *Proceedings of the National Academy of Sciences*, asserting that there was no global warming.

Seitz's letter emphasized his connection with the National Academy of Sciences, giving the impression that the whole thing—the letter, the article, and the petition—was sanctioned by the Academy. (p. 245)

The ruse was apparently well done; the National Academy held a press conference to disclaim the mailing and distance itself from its former president.

A third approach, mentioned too briefly here, was character assault, an odd activity from the men of character who once helped the tobacco industry produce a deadly product. Ben Santer was the lead author of chapter eight of the Intergovernmental Panel on Climate Change's *Second Assessment Report*, which stated, "Nevertheless, the balance of evidence suggests that there is a discernible human influence on global climate" (p. 205). This was compromise wording, worked out after Saudi Arabia and Kuwait objected to stronger language. Partly on the basis of this change to softer language (and partly on events that seemed to have existed only in his head), Seitz charged Santer with fraud in the June 12, 1996 *Wall Street Journal*, followed shortly after by charges in multiple venues from his seeming tag-team partner Fred Singer. After numerous scientists came to Santer's defense, Singer even alleged that Seitz was the victim. Oreskes and Conway efficiently deconstruct this affair (pp. 198–215).

The Legacy of the *Merchants of Doubt*

Merchants of Doubt is disturbing—so disturbing, that it makes one hope that the adage, "The only thing necessary for evil to succeed is for the good to do nothing" [Edmund Burke], is true, and that there are enough good people who will do something.

The doubt strategy has been effective, delaying action on all issues it has touched, but it has been particularly effective with regard to preventing action on climate change. Action appeared imminent in 1989 after President George H. W. Bush campaigned with a promise to counter the "greenhouse effect with the White House effect." But Nierenberg presented the Marshall Institute paper, mentioned above, to the Bush administration, reversing the momentum toward legislation (p. 190), a change which twenty years of increasingly dire data has not reversed. Can good people stop the doubt strategy by doing something? I hope so.

Merchants of Doubt "does something," revealing how deceit has affected public policy. In addition, few who read the book will doubt the reality and danger of human-caused climate change. The spectacle of exceptional scientists resorting to deceit that would embarrass a student portrays unambiguously the weakness of these scientists' case. Simply put, most readers will recognize that Seitz, Nierenberg, Jastrow, and Singer thought deceit was necessary because the facts contradicted what they wished to be true.

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A GLASS DARKLY: Medicine and Theology in Further Dialogue by D. Gareth Jones and R. John Elford, eds. New York: Peter Lang, 2010. viii + 246 pages. Paperback; \$59.95. ISBN: 9783039119363.

How should faith inform the cutting edge of reproductive technologies? When science and medicine intervene to overcome infertility, is this intruding into God's sovereignty over human existence? How can the concept of God's love be discerned and used to shape our moral responsibilities in science and medicine? As technology marches forward, can Christians overcome the default impulse to respond negatively toward novel and new things? These are all very important questions that D. Gareth Jones and R. John Elford ask ethicists and theologians from Roman Catholic and evangelical perspectives to discuss. Their goal is to create a dialogue of "serious listening to perspectives and insights of others."

Jones, a Christian, scientist, and ethicist, begins the dialogue by laying the groundwork of science and technology of human reproduction. Since there is "no virtue in Christians either attacking or dismissing figments of ... imagination," the dialogue must begin with good facts. The key case study question is the following: Is there a difference between the artificiality and technological intrusion needed to care for a two-pound baby born prematurely versus a fragile embryo in a petri dish destined for a womb? Jones takes aim at conceptual framings such as "artificial," "natural," "technology," and "modifying individuals" that can obscure the real underlying concerns and thorough consideration of the issues. Elford finishes framing the discussion by outlying the theological resources available to help us think about science and medicine. What distinguishes the Jewish, Christian, and Muslim understanding of morality from those found in eastern religions is that there can be no spirituality that does not embrace morality. Elford asserts that putting Christian ethics and traditions into action in the midst of life's uncertainties is the real mark of faithfulness.

What follows are two sections that cover diverse Roman Catholic and evangelical responses respectively. The official Roman Catholic response holds the embryo as equivalent in moral status to other persons and maintains a strong resistance against any intervention in the link between sexual acts between husband and wife and procreation. Celia Deane-Drummond explores whether the recovery of prudence, an understanding of wisdom rooted

in charity, can guide us further in considering the common good. For example, she argues that evaluating whether *in vitro* fertilization (IVF) should be used to create embryos should not be reduced to viewing the procedure as an “artificial” intrusion into nature. Rather, the intrusion of the “artificial” into relationships may be more troubling; therefore considerations should explore whether or not IVF harms our social concept of humans, of relationships in marriage and family, and of community.

Gerard Mannion discusses the character and form of Roman Catholic moral interventions in pluralist societies and public moral discourse. His concern is that religious arrogance and certitude create a barrier, and he calls for the church to work alongside the wider world instead of preaching down to it. Ann Marie Mealey critiques the *Dignitas Personae* (the 2008 Congregation for the Doctrine of the Faith doctrinal positions on embryonic issues). She is concerned that the arguments put forth breed too narrow an understanding of natural law, based in physicalism, which can overlook the inclusion of reason and experience.

Andrew Goddard reviews ways the Bible is used to articulate an ethical standpoint. He appeals to Allen Verhey’s essentials for Christian interpretation, namely reading the scriptures humbly and within the context of Christian community. J. Stephen Bellamy bemoans absolutist arguments that an embryo should be regarded as a fully protectable human life from the time of fertilization, as commonly used in public debates by various evangelical advocacy groups. His concern is that such a rigid interpretation negates contributions from other thoughtful Christian voices and disenfranchises those caught in the complex decision making on these issues. Adam Hood points to the need for examining the underlying metaphysical assumptions that shape these debates.

Jones concludes the book with a call for more dialogue. Society needs a coalition of voices with different experiences, wisdom, and expertise. Dialogue will help us fearlessly examine our reasons for our faith and how our underlying metaphysical assumptions, religious traditions, and ethical frameworks influence our stand. He rightly states that it is unfair to expect precise answers, but tells us, rather, that the expectation should be guidance. Dialogue is needed because Christians “lack definitive guidance from the biblical writers and from most church traditions ... on how best to value some embryos when faced with having a child with a particularly distressing genetic disease or when confronted by infertility.”

However, in reading *A Glass Darkly*, one finds much dialogical exchange, but no clear guidance emerges. The dialogue is very academic, highly geared toward ethicists and theologians. While serious students of theology and ethics will be challenged to think deeply by reading this dialogue, a further step is needed to compile the different experiences, wisdom, and expertise in such a way that guidance is accessible for nonexpert practitioners who are seeking to act in accordance with their faith.

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HISTORY OF SCIENCE

THE DARK SIDE OF CHARLES DARWIN: A Critical Analysis of an Icon of Science by Jerry Bergman. Green Forest, AR: Master Books, 2011. 270 pages. Paperback; \$13.99. ISBN: 9780890516058.

Two mistakes that amateur historians often make are these: interpreting and evaluating past events in terms of current knowledge (doing “Whig History”), and interpreting or selectively choosing historical documents/books to support a current position (doing “eisegesis”). Bergman’s book is replete with both types of errors. In addition, there are numerous logical inconsistencies in the argumentation and many evidences of poor editing. The result is a book that tells us what Bergman has found to bolster what he apparently believed before he began his research, but it is not a book that can justify those beliefs to anyone who demands good scholarship.

Bergman’s thesis seems to be this: the academic/scholarly community has engaged in a conspiracy to suppress the “real” story of Charles Darwin, refusing to admit that

1. Darwin was a poor scientist, both in terms of practice and theorizing;
2. Darwin plagiarized the theory of evolution by means of natural selection;
3. Darwin was psychologically unbalanced; and
4. Darwin held immoral views (e.g., racism and sexism).

By claiming to tell us this “real” story, Bergman constructs an ad hominem argument by which he seemingly intends to discredit both the man and his theory—and possibly that community of academic scholars who value the theory and admire the man.

The errors and inconsistencies in this book are too many to enumerate and refute, so in this review I will simply give a few examples to indicate why the book should not be taken seriously. Let’s begin with the question of plagiarism. Bergman notes a number of pre-Darwinian evolutionists and complains that Darwin did not acknowledge them in citations. Even more importantly, Bergman accuses Darwin of actually plagiarizing from Edward Blyth and Alfred Russel Wallace. Of course, as Bentley Glass noted, evolutionary ideas were hotly debated from the mid-eighteenth century on, and it is generally accepted that ideas that are commonly discussed need not be cited.¹ But even if Darwin should perhaps have noted his precursors more, what about the main point—that he really utilized Blyth’s and Wallace’s ideas?

Bergman cites Loren Eiseley as evidence that Darwin had known of Blyth’s research and ideas, especially his concept of “natural selection,”² but Eiseley’s argument has been refuted by numerous scholars since his article appeared in 1959 and his book came out in 1979. As the editors of Darwin’s correspondence point out in a footnote to a letter written by Darwin to J. S. Henslow in late 1832, Blyth’s work itself was based on the widely well-known work of William Sharp Macleay.³ Darwin was merely discussing ideas widely known in the current debate over

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evolution. Moreover, Darwin did think highly of Blyth's observations which he cited three times in *On the Origin of Species*. However, as Susan Sheets-Pyenson points out, "Blyth seemed to function for Darwin as an imaginary devil's advocate."⁴ Blyth affirmed special creation and the fixity of species, not evolution, but his evidence pushed Darwin to refine his own theory in a way to account for the data Blyth presented. In other words, it was Blyth's observations and facts (which are used and cited as noted above), not his theorizing or explanations, that impressed and influenced Darwin.

But what about Alfred Russel Wallace? Bergman uncritically accepts Rhawn Joseph's claim that Darwin had "abandoned the field of 'evolution' early in his career."⁵ No one acquainted with Darwin's correspondence and the continuing comments, questions, and requests for information related to the development of his theory could make such an outlandish assertion. In May 1857, Darwin continued his correspondence with Wallace and wrote,

This summer will make the 20th year (!) since I opened my first-note-book, on the question how & in what way do species & varieties differ from each other. — I am now preparing my work for publication, but I find the subject so very large, that though I have written many chapters, I do not suppose I shall go to press for two years.⁶

In fact, on "14 May 1856, Charles Darwin recorded in his journal that he 'Began by Lyell's advice *writing* species sketch.'⁷ Hence, when Darwin received Wallace's letter and manuscript in June 1858, he was well into his book. He wrote to Lyell admitting that he had been too slow in publishing his ideas and commending Wallace in these words:

If Wallace had my M.S. sketch written out in 1842 he could not have made a better short abstract! Even his terms now stand as Heads of my Chapters.⁸

Lyell and J. D. Hooker encouraged Darwin to publish Wallace's paper, but they also told him to write a short synopsis of his own to go with it. What Darwin sent to the Linnean Society, according to the historian of science Peter J. Bowler, consisted of

(a) a short extract from Darwin's manuscript, (b) part of a letter that Darwin had sent to the American botanist Asa Gray in 1857 (this demonstrated Darwin's priority) and (c) Wallace's paper.⁹

Bowler also refutes the charge of plagiarism and analyzes the differences between Wallace's paper and Darwin's. He notes, first, Wallace's lack of interest in artificial selection and his failure to appreciate the analogy between artificial and natural selection, and second, his silence on how natural selection acts on differences between individual organisms to bring about changed populations.

These comments should be sufficient to demonstrate the error of Bergman's plagiarism charges. However, there are other issues related to them that need to be addressed. Bergman seems to chastise and devalue Darwin because others such as Erasmus Darwin, Jean-Baptiste Lamarck, Robert Chambers, and Patrick Miller had talked about evolution before him. Science does not give priority to the individual who first proposes a theory or publicizes an

idea. If that were the case, we would study Aristarchus of Samos rather than Copernicus and Galileo for heliocentrism. No, science credits the individual who not only puts forward a theory, but also provides evidence to support the theory and articulates a research program that can be built on the theory and evidence. However, Bergman argues that Darwin was a bad scholar and an inept scientist. His failures, according to Bergman, included numerous errors in his text (but Bergman does not explain if these were simply spelling/grammar mistakes, mistaken attributions, etc., or serious content errors, faulty analysis, erroneous conclusions, and fraud). No reputable historian of science would deny that Darwin sometimes erred, based on misunderstanding of the data provided him by others or on errors in those data, or on the state of science at that time. But Bergman fails to understand that Darwin thought and acted as a nineteenth-century Englishman, not as a twentieth- or twenty-first-century American. In other words, Bergman is doing "Whig History." Many of Darwin's methods, ideas, and conclusions were consistent with those of other scientists and thinkers of his period. Mendel's research was not rediscovered until early in the twentieth century, and until then, Lamarck's theory was the most common alternative explanation for heredity. Nineteenth-century Europeans in general believed that Africans were "lower" forms; some even questioned if they were of the same species as Europeans. And eugenics was a strong force in the USA through the Second World War.

But, so what? What if Darwin made mistakes? What if he held ideas which we now know to be wrong? What if he did criticize his colleagues, enjoyed hunting (including killing) animals, had unorthodox (or maybe even no) religious views, possibly had psychological issues, or had doubts about his theory? If we rejected every scientist who exhibited these traits, along with his (or her) theory, we would be back in the Stone Age. Newton would be out, since he was heterodox in theology, was viewed as less than congenial by some of his colleagues and has been described as a "solitary scholar,"¹⁰ performed alchemical experiments, probably even having a psychological breakdown as a result of mercury poisoning related to those experiments, and was involved in a priority dispute for many years with Gottfried Wilhelm Leibniz over who invented the calculus. James Watson and Francis Crick, the "discoverers" of the double helical structure of DNA, unethically "appropriated" Rosalind Franklin's research and were sexist, and Crick, at least, was a philosophical materialist and a eugenicist.¹¹

Ad hominem arguments, which are the essence of this book, provide irrelevant and insufficient grounds for evaluating scientific theories. Just as scientific hagiographies distort the scientist and his or her work by portraying an idealized person, books such as Bergman's distort the individual and his or her accomplishments by demonizing the person. Neither is good scholarship and both should be eschewed.

Notes

¹Bentley Glass, Owsei Temkin, and William L. Straus Jr., eds., *Forerunners of Darwin: 1745-1859* (Baltimore, MD: Johns Hopkins Press, 1959), v.

²Loren Eiseley, *Darwin and the Mysterious Mr. X* (New York: E. P. Dutton, 1979), 45-80. An earlier form of this chapter can be found in

Eiseley's "Charles Darwin, Edward Blyth, and the Theory of Natural Selection" in the *Proceedings of the American Philosophical Society* 103 (1959): 94–158.

³The *Correspondence of Charles Darwin, Volume 1: 1821–1836* (Cambridge: Cambridge University Press, 1985), 282, footnote 8.

⁴Susan Sheets-Pyenson, "Darwin's Data: His Reading of Natural History Journals, 1837–1842," *Journal of the History of Biology* 14, no. 2 (Fall 1981): 243.

⁵Jerry Bergman, *The Dark Side of Charles Darwin: A Critical Analysis of an Icon of Science* (Green Forest, AR: Master Books, 2011), 152 citing Rhawn Joseph, *Astrobiology, the Origin of Life, and Death of Darwinism* (San Jose, CA: University of California, 2000), 223.

⁶The *Correspondence of Charles Darwin, Volume 6: 1856–1857* (Cambridge: Cambridge University Press, 1990), 387.

⁷*Ibid.*, xiv.

⁸The *Correspondence of Charles Darwin, Volume 7: 1858–1859* (Cambridge: Cambridge University Press, 1990), 107.

⁹Peter J. Bowler, *Charles Darwin: The Man and His Influence* (Cambridge: Cambridge University Press, 1996), 112.

¹⁰Robert Westfall, *Never at Rest: A Biography of Isaac Newton* (Cambridge: Cambridge University Press, 1980). The title of chapter 3 is "The Solitary Scholar."

¹¹In 1964, Francis Crick, Hermann J. Muller, and Joshua Lederberg urged that the USA establish a large-scale eugenics program, and Crick suggested "the reversible sterilization of the citizenry by placing 'something into our food' and licensing 'the people with the qualities we like' to bear children." Cited by Howard L. Kaye in his *The Social Meaning of Modern Biology: From Social Darwinism to Sociobiology* (New Haven, CT: Yale University Press, 1986), 48.

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MATHEMATICS AND RELIGION: Our Languages of Sign and Symbol by Javier Leach. West Conshohocken, PA: Templeton Press, 2010. xi + 188 pages, with glossary and index. Paperback; \$20.00. ISBN: 9781599471495.

Conceding that twenty-first century, visually oriented denizens no longer inhabit a literate culture, but seeking to reach out in words to those curious about our human place in the cosmos, the Templeton Science and Religion Series commissions compact scientific/theological explorations of big questions. "Doomed to fail," a skeptic scoffs. "But worth the effort," a sympathetic respondent counters, "if such a text gives, as intended, a good overview of the field for a general audience or rouses the occasional reader to delve more deeply into works on a similar theme."

Connections between mathematics, religion, and metaphysics spark few scholarly fires today. Professional mathematicians never explore such matters as part of their education, and hardly any theologians or philosophers are prepared to follow technical discussions that venture beyond elementary mathematics. Nevertheless, a small pocket of readers is interested in all of this on a general level, at least in North America, where the largely evangelical Association of Christians in the Mathematical Sciences continues to flourish.

This book comes out of a very different context and tradition, however. The author is a Jesuit priest who holds an academic position in mathematics and logic at a Span-

ish university. Trained in mathematics, philosophy, and theology, Javier Leach seems ideally qualified for writing a book on this topic. Drawing upon these disparate backgrounds, he relates religion, science, mathematics, and metaphysics not as antagonists or isolated spheres but as fields sharing common features and interests.

Mathematics and Religion is quite short, shorter even than the bibliographic data above suggests. The body of the text consists of nine brief chapters that run to only 130 pages. The remainder of the book is devoted to a preface (5 pages), ten rather technical appendices (30 pages), a glossary (9 pages), an essay on resources (6 pages), and an index (10 pages). With editorial assistance, the author might have integrated some of his appendices' material into the text (and dropped most of the remainder), but perhaps the publisher judged that enlarging the text proper in this way would reduce sales. Better editing would also have improved the English in a number of places. Readers familiar with idiomatic mathematical terminology will find statements such as " m is equal or less than n ," " π is transcendent," and "odd-grade polynomials with real coefficients have a real number solution" awkwardly phrased or momentarily perplexing.

The first two chapters of the book lay out Leach's overall schematic. Mathematics deals with objects of the mind via logic and formal language. Science deals with objects we perceive with our senses, and it asserts truths about them in representational language, though mathematics and logic are also indispensable. Metaphysics and religion deal with ultimate causes, which mathematics and science are constitutionally unequipped to address. The language of metaphysics and religion employs symbols and terms having personal, communal, and traditional meanings in addition to referring to ultimate realities. Appropriate evidences for the validity of claims in these fields differ, but assertions in each area must strive for consistency; without that, language and thought have no real value.

Chapters three and four give a highly condensed and Eurocentric history of mathematics and logic. Chapter five briefly recounts the rise of modern science, focusing mostly on Galileo, including his conflict with the Roman Catholic church, but giving some attention to Newton and a few later thinkers as well.

With this introductory material out of the way, chapters six and seven focus on the historical and systematic process of formalizing mathematics, and on the rise and contours of mathematical logic. These receive more extended treatment (40 pages), being closest to Leach's area of expertise and relating most directly to the current state of mathematics. Given its broad scope, however, this material contains a number of oversimplifications and omissions. Cantor is portrayed as if he reduced all of mathematics to set theory. Peano is never mentioned for his work on formalization. Brouwer's intuitionism seems to arise in response to Gödel's incompleteness results. Constructive mathematics is claimed to be a subset of classical mathematics. The syntax and semantics of formal logic are presented but with almost no mention of the role deduction systems play in constructing proofs (even though Gödel's completeness and incompleteness results touch primarily on deducibility). And so on. These defi-

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ciencies may be unavoidable, given the brevity of the text, but such are evidently the consequences of aiming to be so concise while trying to cover such a broad expanse.

Leach ties the fields of mathematics, science, metaphysics, and theology together with the connecting threads of language and logic. As the preface states, "This book is about our languages, ... by which we convey meaning." In all four fields, theories are constructed with language and rely upon logical reasoning. Individually, they share an interest in logical consistency, a concern made prominent by twentieth-century foundations of mathematics. Jointly, they complement each other and offer truths from their own perspectives.

Twentieth-century foundational developments in mathematics (especially incompleteness and undecidability results) also suggest, according to Leach, that mathematics is pluralistic and open-ended. Different perspectives are welcome, as are competing theories. If this is so for our most objective field of thought (and Leach sees this trend in physics as well), we certainly should be open to a variety of complementary perspectives from metaphysics and religion. Room is thus carved out for metaphysics and religion to consider ultimate questions. Mathematics cannot even decide all the important issues in its own field with axiomatic and foundational methods; it certainly cannot dictate positions outside its purview.

Complementarity is not due to these areas being totally disjointed. Each field has its own focus, language, and criteria for evidence, but it is a mistake, Leach says, to see them as nonoverlapping. They do not describe different worlds. "Mathematics and science try to answer how things are. Metaphysics and religion try to answer why the world is the way it is" (p. 128). Leach sums up his view of their interrelationships with a model he calls *Non-Symmetrical Magisteria*: while these fields each have authority in their own domains, they are related through language and logic, albeit in a nonsymmetrical way.

Religious knowledge needs science, while science can do without religion. In effect, this asymmetry is a plus for science by making it autonomous, but it is also a plus for religion by endowing religion with a more comprehensive vision ... [F]aith cannot close its eyes to mathematics and the empirical sciences. I can separate mathematics from theology, but I cannot separate theology from mathematics. Mathematics and the empirical sciences are independent of religious beliefs, but theological reflection cannot do without mathematics and the empirical sciences. (p. 131)

In this way Leach gives a sort of primacy to mathematics and science. In fact, he even says a few pages earlier that "the history of Christianity ... can be viewed as a series of responses to scientific cultures over the ages" (p. 127). He finds no intrinsic influence passing from religion and philosophy to mathematics and science; the latter are autonomous. But a grounded and well-rounded metaphysics and theology need to take into account what we know about/from mathematics and science.

Assessing the book's success in relating mathematics and religion depends upon one's own preconceptions of the fields involved and how they are properly linked.

The heavy focus on logic and the posited asymmetric relationship between mathematics and religion/philosophy are not universally accepted by historians and philosophers of science and mathematics. Many now conceptualize mathematics more in the way it is holistically practiced than as an abstract body of formalized theoretical results. Leach's outlook may also be questioned by evangelical Christian mathematicians, some of whom believe there is a more integral way to relate their faith to their professional work. But *Mathematics and Religion* does offer an informed discussion of the topic by a mathematician committed to faith in Jesus Christ, and as such provides a viewpoint readers can use to test and sharpen their own ideas on the relationships.

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ORIGINS & COSMOLOGY

EVOLUTION: A View from the 21st Century by James A. Shapiro. Upper Saddle River, NJ: FT Press Science, 2011. 253 pages. Hardcover; \$34.99. ISBN: 9780132780933.

Whether James Shapiro is prescient or just a maverick, time will tell. Either way, this relatively short volume is a refreshing change from the constant barrage of books lambasting other positions while rehashing the same tired arguments for their own. Shapiro argues against Darwinism, but for evolution: he presents an evolutionary model that is saltational, a teleological model in which the cell itself sets the goal, a natural genetic engineering model without an intelligent engineer. Exceedingly well documented and highly technical, this will not be an easy read unless you have a good knowledge of modern molecular genetics, but Shapiro suggests a method whereby other readers can get the main idea without getting lost in the details.

The book is divided into four parts (without designated chapters). The first three lay out what we know about the way the cell works, focusing on recent advances in molecular biology. The last part shows how the first three suggest a new conceptual basis for evolutionary research, and why philosophical commitments prevent many researchers from accepting this new approach. The text itself is less than 150 pages, followed by a 25-page glossary and 65 pages containing over 1,000 references to the primary scientific literature. There are over three hundred more references online, documenting the examples cited in tables in Parts Two and Three of the book.

Throughout the book, Shapiro challenges many key tenets of Darwinism, including gradualism and the primary role of natural selection. He begins the book with the statement,

Innovation, not selection, is the critical issue in evolutionary change. Without variation and novelty, selection has nothing to act upon. So this book is dedicated to the many ways that living organisms actively change themselves. (p. 1)

Shapiro then proceeds to show how cells not only change their gene expression, but also make rapid changes to the

DNA itself, in response to environmental factors. These changes appear to be targeted, and allow significant heritable change to take place within a generation. Along the way he discusses what he sees as an ongoing change from a mechanistic model to an informatic view of living organisms, leading to a systems engineering metaphor in which the cell can no longer be spoken of in reductionist terms as merely the sum of its component parts.

In Part One, Shapiro claims, "Life requires cognition at all levels" (p. 7). While many would challenge the equation of chemical signaling with cognition, he cites several examples of how all cells respond to changes in the environment, and how that affects cell reproduction. His description of control mechanisms in the *lac* operon shows the complexity of that system, but one might wonder why he did not instead describe replication and its control mechanisms, which are just as complex and would have tied in better with the rest of the chapter. He goes on to make the claim that DNA replication tends to be conservative in times of successful growth, but allows active restructuring in times of stress. He says that the numerous proofreading systems operate as if they were applying "fuzzy logic," changing the degree of precision in response to the degree of stress, and then he describes the complex SOS response in bacteria, mating in yeast, and cell death (apoptosis) in multicellular organisms to demonstrate this. The main purpose of Part One is to convince the reader that there is a complex interaction going on in the cell all the time, and that, contrary to the unidirectionality of the central dogma (DNA produces RNA produces protein), the information transfer goes in all directions.

The controversial claims begin in Part Two, in which Shapiro says that, in contrast to the traditional view of the genome as a "read-only memory (ROM) system subject to change by stochastic damage and copying errors," it would be better to view it as a "read-write (RW) memory system subject to non-random change" (p. 28). Most of Part Two is devoted to a description of various molecular mechanisms for reformating the information in the genome. The main contention is that if cells can restructure their genome during normal life cycles, there is no reason why they cannot do the same to produce "significant evolutionary novelties" (p. 56), and that this is more probable than the likelihood that "each individual component of these elaborate circuits evolves by making its own independent random walk" (p. 31). He cites numerous studies demonstrating that changes in the genome have been induced by various signals or conditions, using numerous "natural genetic engineering functions" in organisms as diverse as bacteria and humans. From various types of epigenetic control to ten different mechanisms for making changes in the DNA, Part Two is written at a level that will be challenging to anyone without extensive training in molecular biology. It could be used in an advanced course in molecular genetics as a summary of the various types of genetic elements and how they work.

In Part Three, Shapiro directly takes on the Darwinian ideas of gradualism and natural selection. Claiming that gradualist models are only supported by analysis of certain types of DNA, Shapiro cites a broad range of studies to show that "nature does indeed make leaps" (p. 90) and that "selection has never led to formation of a new spe-

cies" (p. 121). Going beyond transposable elements and other ways of reorganizing the DNA cited in Part Two, he shows how processes like horizontal transfer and symbiosis can lead to major changes in one generation. Most of Part Three, although not easy, should be accessible to undergraduate science majors, or nonmajors who keep up with science news in the popular press.

The last part of the book presents no new ideas, but summarizes the argument at a level the nonspecialist will be able to understand (an upper undergraduate level). Shapiro concludes that living organisms are connected by common descent, but that the evidence points to abrupt change as a result of horizontal transfer, movement of transposable elements, chromosome rearrangements, genome duplication, and cell fusion, all of which reassemble useful genomic elements in novel ways. This happens not because of any innate drive, nor because of random, accidental genetic change, but, rather, it is due to a built-in capacity to rearrange genetic information to achieve specific purposes. He claims the cell's desire to survive is the teleological agent directing change, especially at times of severe stress and unparalleled opportunity such as the great mass extinctions.

Beyond the science itself, Shapiro addresses the connection between interpretation of the evidence and philosophical presuppositions. He recognizes that many evolutionary scientists will not readily accept the conclusions of the book, because of prior philosophical commitments. He claims that the ideas that genomic changes are random and undirected (p. 56) and that cells cannot operate teleologically (p. 137) are philosophical prejudices that prohibit proper interpretation of the evidence. These prejudices spring from a fear of vitalism (p. 138) and ad hoc assumptions about the nature of genetic change based on the principle of gradualism (p. 142). In his words, "The common impulse is to declare 'impossible' what does not agree with the assumptions or prejudices of a particular school of thought" (p. 80).

Responses to this book will predictably be varied, depending on the perspective of the reader. Proponents of Darwinian evolution will undoubtedly claim that all of his examples represent small changes and only appear nonrandom and teleological as a result of the selective influence of natural selection acting on stochastic variation. Proponents of intelligent design will agree with his interpretation of the evidence, but claim that the presence of an inbuilt system of genetic engineering is yet another level of complexity that points to the presence of an intelligent engineer. Proponents of young earth creation will pick up on his comment that, "as many biologists have argued since the 19th century, random changes would overwhelmingly tend to degrade intricately organized systems rather than adapt them to new functions" (p. 134). In other words, most everyone will find something to agree with and much to disagree with in this book. Nevertheless, it will be useful to all because so much of the book is devoted to bringing together in one place a huge volume of research, however it is interpreted.

There are several areas that Shapiro does not address that weaken his argument. He does not discuss the currently popular notion of emergent properties, a mechanistic explanation that would challenge his metaphor of

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systems engineering. More importantly, although he admits, "From an evolutionary point of view, the main question to ask is how transcriptional regulatory circuits arise in the first place" (p. 31), he does not really address how these, or the basic genomic components themselves, originated. As modern technology shows, it is relatively easy to shuffle or modify components, compared to the work of fashioning innovative, functional components in the first place. This is closely related to the origin of life, which remains largely a mystery, with "little solid evidence" (p. 128).

Personally, I view Shapiro as prescient. Of course that is largely because the evidence he presents and his interpretation of it fulfill predictions I made to my students a decade ago about things that would be discovered soon (too bad I did not put those predictions in writing). In other words, I think his arguments are valid because they support my own position and philosophical prejudices. This is definitely a minority position at the moment, but time will tell if it remains that way. Either way, it is definitely worth reading.

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PHILOSOPHY & THEOLOGY

AGAINST ALL GODS: What's Right and Wrong about the New Atheism by Phillip E. Johnson and John Mark Reynolds. Downers Grove, IL: InterVarsity Press, 2010. 119 pages. Paperback; \$15.00. ISBN: 9780830837380.

Can anything good come from the new atheism? Phillip Johnson and John Mark Reynolds argue in *Against All Gods: What's Right and Wrong about the New Atheism* that the new atheists raise important and substantive questions deserving of serious attention. Moreover, the notoriety of the new atheism offers increased opportunity to advance Christianity's critique of the movement itself.

Johnson and Reynolds engage the new atheism on two levels: one, objecting to the new atheism's alternatives to religious explanation, particularly its commitment to Darwinism; and two, explaining Christian commitments that are frequently misunderstood or ignored by the new atheists. Johnson takes the first task; Reynolds, the second.

The belief that no God exists is obviously not a new phenomenon. In the past few decades, however, an evangelical atheism has developed, one that makes the eradication of religion and religious belief a fundamental goal. The new atheist celebrities are often scientists or philosophers committed to Darwinism. Among these are Richard Dawkins, Sam Harris, and Daniel Dennett. The movement also includes literary figures, such as the late Christopher Hitchens, who argue from a familiar conceit that religion is socially divisive and destructive.

Johnson writes the first five chapters of the book, and as those familiar with Johnson's previous work would expect, he focuses on the "science" behind the new-atheism movement. The new atheists typically frame the debate as a conflict between science and religion. Johnson

demurs, recognizing that the issues are not scientific ones; rather, they are philosophical in nature.

For example, he comments on an exchange between Francis Collins and Richard Dawkins, appearing in *Time* magazine in 2006. Dawkins alludes to the "multiverse" theory of the universe's origins. The theory is used to contradict the "fine-tuning" argument that a universe with life-conducive properties would not likely exist unless it were created by God. The "multiverse" hypothesis posits, instead, the actual existence of an indefinite number, or at least a large number, of alternative universes. If these universes exist, then there is some probability that our universe with its life-conducive properties would be one of them. As Johnson points out, the "multiverse" hypothesis, with its postulation of multiple, nonobservable, alternative universes, is philosophical speculation, and not science.

Johnson challenges the new atheists in a myriad of other ways. Johnson believes that Steven Pinker and the new atheists misconstrue the nature of faith, and because of that, they fail to recognize the role of faith in science. The new atheists understand that faith is belief without, or contrary to, reason. Johnson discusses a proposal made at Harvard to include a course in its required curriculum on faith and reason. Pinker, an evolutionary psychologist sympathetic to the new atheism, railed against the proposal because it puts superstition, that is, faith, as an equivalent way of knowing. Pinker's view of faith, as Johnson describes it, is to believe "something (such as that God exists) *without good reasons to do so*" (p. 28, my emphasis).

Quoting C. S. Lewis to make his point, Johnson argues that faith is not believing without reason; rather, faith is confidence in a reasonable belief when counter-reasons exist. On this view, *contra* the new atheists, faith is not a leap, but rather a confidence in the future vindication of a belief. In this sense, Johnson argues that science requires faith as much as religion does.

Using as his foil Pinker's suggestion that our planet is but an otherwise insignificant speck in a vast purposeless universe (p. 26), Johnson raises the issue of cosmic design. Johnson counters that Pinker has no scientific basis for his claim. In fact, Johnson concludes, it is reasonable to believe that "our planet is unique in the universe because intelligent life exists only on this planet and has never existed anywhere else" (p. 44). In his view, this is important because it shows that the scientific evidence itself lends weight to the theistic hypothesis. The immense improbability of our planet's being uniquely suited for life, according to Johnson, suggests a Designer.

In his most incisive chapter, Johnson challenges the new atheists' commitment to Darwinism as a worldview. He writes that Darwinism can be taken in either of two ways: as a strictly scientific theory of biology or as a way of thinking about things generally, namely, as a worldview. As a worldview, or as a general way of thinking about everything, Darwinism is a philosophical thesis, not a scientific one. Johnson points out numerous tensions when Darwinism is taken as a worldview. Among those he highlights, two are particularly important. First, Darwinism makes a hash of morality. Darwinism, when taken comprehensively, inevitably leads to social Darwin-

ism with its attendant injustices. Natural selection sits with normative morality very uneasily. Second, Darwinism as a worldview is self-defeating. Johnson points out that Darwinists explain religious belief by way of Darwinian natural selection, not by reasonableness. Where, then, Johnson asks, does that leave Darwinism itself? If belief arises because of survival value, then Darwinism's own reasonableness must be questioned. Johnson suggests that Darwinism, taken as a worldview, is "hoist on its own petard," so to speak.

The first five chapters of *Against All Gods* criticize the arguments of the new atheists. In the sixth chapter, the focus shifts. Reynolds takes up the task of clarifying Christian beliefs often misunderstood by naturalist critics. Reynolds discusses the Bible (chapter 6), the relationship between faith and reason (chapter 7), and the development of western culture (chapter 8).

Reynolds makes the case that the naturalists' critique often reflects an inability to read the Bible properly as an ancient text. The accusation, for example, that the God of the Bible is morally corrupt because he commanded genocide, rips the biblical story out of its historical context and uncharitably ignores how Christians actually interpret their text. Reynolds suggests that in the conquest narratives, God was "faced with an educational problem" (p. 79). God had to accommodate himself to a people with a very limited horizon of understanding. Given their primitiveness, God commanded, for example, "total war," because it was the "best of the bad options available in the time and with the people he had" (p. 80).

Reynolds rightly makes the point that understanding an ancient text involves hermeneutical sophistication that the new atheists either do not understand or refuse to understand. If the Bible is a divine and human text, one would expect it to reflect the "finitude, folly, and foibles" (p. 71) of the human authors. For that reason, interpreting the text is more complicated than the new atheists suggest.

Reynolds then discusses the issue of faith and reason, particularly in a Christian understanding of education, where faith and reason are complementary rather than antagonistic. According to the Christian tradition, education is about discovery and wonder. Education is not an exercise in endless scepticism, but rather in openness and awe before creation. Faith aids in discovery by providing a "hypothesis that can be tested against reason and experience" (p. 89). Faith provides an explanatory web of belief, a worldview if you will, that education and inquiry seek to justify. Reynolds describes it this way: "Education is the process of grounding our religious and cultural hopes in long discourse, reason and life experience" (p. 89). And ultimately, Christian education is training for excellent living. Christian education, oriented as it is to the cardinal and theological virtues, prepares a student for happiness and fulfillment.

In the final substantive chapter, Reynolds addresses the argument made by Hitchens and others that religion is destructive of culture and civilization. Here he provides a counter-narrative to the frequently repeated allusions to the Crusades and *jihad*. In a blazingly fast overview of the history of Western civilization, Reynolds makes the point that Western culture developed, not in spite of

Christianity, as the new atheists might suggest, but because of Christianity. Western culture and civilization—the arts, science, political liberty—developed from the confluence of Christianity and Greek philosophy, nurtured within the context of a Christian worldview. It is all well and good to criticize religion for its failures, but, Reynolds contends, one must also praise religion for its contributions.

Reynolds concludes with a challenge to the sort of secularism advocated by the new atheists. Secularism cannot sustain Western culture as it has been received. Secularism's lack of a higher vision leads to cultural and political impoverishment. It has no conception of a common good that would provide social unity or give meaning to human choice beyond satisfying a particular individual's subjective wants and desires. Moreover, secularism has no resources for self-correction. To what standard will the secularists appeal to correct social evils?

Johnson and Reynolds have provided a useful book. I recommend it. Its chief virtue is in distinguishing clearly when the new atheists are philosophers masquerading as scientists. Johnson rightly hammers home the point that Darwinism cannot answer certain kinds of questions precisely because it is a scientific theory and not a philosophical one. And Reynolds's contribution is particularly helpful to disabuse the new atheists of misconceptions of Christian theism.

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NEW PROOFS FOR THE EXISTENCE OF GOD: Contributions of Contemporary Physics and Philosophy by Robert J. Spitzer. Grand Rapids, MI: Eerdmans, 2010. 336 pages. Paperback; \$28.00. ISBN: 9780802863836.

The title of this book will probably put off some people. One group that will be put off is those who reject the whole idea of an apologetic for the existence of God. For such people, the hallmark of true faith is to believe without any good reason at all, and proofs of any sort irritate them. Another group believes that we can persuade ourselves and others that God exists, but rejects any type of logical or scientific proof. For this group, we must simply "see" God in nature or in the inner experience of our souls. To give arguments for God is like giving arguments that a sunset is beautiful; we can point to it, but we cannot quantify it. Yet another group, in which I include myself, is quite happy to use logic and science in aid of persuading ourselves and others that God exists, but has found the typical philosophical treatises on this subject dry and far from the living God of the Bible.

In this respect, I found some parts of Spitzer's book a pleasant surprise. The book does not entirely revolve around deductive "proofs" of the existence of God. Part One could more accurately be titled "newly updated, extremely strong evidential arguments for the existence of some super-intelligent being." This part of the book is the best and most up-to-date survey I have seen of the cosmological arguments for the existence of God, including the crucial evidences for a beginning of time

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and fine-tuning of the characteristics of the universe. It is surprisingly well written and accessible to nonexperts, but also gets the science right without oversimplifications. I will recommend this section to all my friends looking into this subject.

In the same vein, Part Three of the book presents an inductive argument from desire, which will be familiar to readers of C. S. Lewis: all humans appear to have deep desires that can only be fulfilled by God. Our general experience is that the things we desire exist, even if they are not at hand. For example, a man dying of hunger in the desert may try to eat sand, but his hunger is evidence that food exists somewhere.

Unfortunately, Part Two has exactly the type of abstract thicket which I feared on reading the title of the book, even though I have enjoyed reading many carefully reasoned works such as *Classical Apologetics* by Sproul, Gerstner, and Lindsley, and the works of Jonathan Edwards, Aquinas, and Augustine. The chapters in this part of the book involve layers of definitions and syllogisms, which will be hard going for a layperson not well versed in logic. Moreover, even if one agrees with all the arguments, all one has deduced is some abstract being compatible with deism and not necessarily the living God of the Bible. Nevertheless, I am fully supportive of arguments that lead us to some limited concept of God. My chief problem with this part of the book is that I did not find many of the arguments convincing, even as a believer in God, and I doubt that many atheists will.

Chapter three in Part Two presents a nuanced version of the argument of the uncaused first cause, well reviewed in *Classical Apologetics*, mentioned above. (The author uses the language of “conditions” rather than “causes” to avoid unnecessary entanglement in the definition of a “cause.”) At a key point in this argument, however, the author states that an infinite number of causes, each of which depends on another cause, is “unachievable,” but gives no argument why. Later in the book, we learn that the author believes no infinity can exist, and he gives some arguments. I will discuss the author’s view of infinities below. For the argument of the first cause, however, a rejection of infinities is not necessary. A better line of argument, which is persuasive to me, is to note that an infinite number of successive causes in an eternal chain can be lumped together as a single uncaused (or “unconditioned”) entity; in this case, the chain of causation itself is uncaused and eternal.

The section on “simplicity” in this chapter confused me until I realized that the author was using a special, philosophical definition of the word “simple.” The correct word to a physicist would be “fundamental.” Thus, a field is more fundamental than a particle, which is more fundamental than a molecule. That which is more simple, or fundamental, has more possibilities (this sounds more complex to me, not more simple). The main value of this section is to show that dualism and polytheism are not logical, and it succeeds fairly well at that.

This chapter also, like many philosophical books I have read, gets some basic concepts in quantum mechanics wrong, but this is forgivable, since so many things are confusing in quantum mechanics. Saying a particle is

“self-enclosed,” as the author does, has no meaning in modern physics. It seems to imply the concept of a boundary or edge to a particle, but such a boundary can neither be defined nor even discussed meaningfully in quantum theory. The author also repeats a common truism that particle behavior is incompatible with wave behavior, but it is well known that wave behavior in quantum field theory gives rise to particles as resonances of the field (see, e.g., D. Snoke, *Solid State Physics: Essential Concepts*, chapter 4). The existence of particle-like behavior in the theory of oscillating fields is no great mystery. Some particle-like behavior does seem to go beyond what can be deduced from the field theory, but it is an overstatement to say that the waves know nothing of particle behavior.

Chapter four, presenting a “Loneragian” proof, was a low point for me; the chapter seemed to involve a large number of bare assertions and word-play with definitions. For example, on page 147, he asserts that all intelligence involves a “pure, unrestricted desire to know.” Is that true for intelligent dogs, or really boring people? It is at least an evidential point begging evidence. On page 169, he makes a leap from intelligibility—the possibility of being understood—to intelligence when he says that intelligibility must itself equal intelligence. This also begs for evidential or inductive argument. The famous statement of Einstein, that the most incomprehensible thing about the universe is its comprehensibility, seems to me the basis for another good inductive argument, along the lines of the argument from desire, but that is not done here, and the argument comes across as very flimsy.

In chapter five, on the Kalaam argument, and in several other places, the author rests heavily on the premise that no true infinity can exist in nature, and seems to feel that Hilbert settled this question once and for all with his “finite mathematics” program. This assertion will come across as strange to anyone trained in mathematics. Hilbert’s program has been widely discredited and made irrelevant by Gödel’s incompleteness theorem. And the mathematical statements that the author makes in this book convey a lack of understanding about the mathematics of limits. For example, the author asserts without debate that zero times infinity, which is to say zero divided by zero, is unequivocally equal to zero. Mathematicians would say it depends. Some zeroes are smaller than others, so to speak, and often zero times infinity gives a finite number. Similarly, the author asserts that a finite interval cannot contain an infinite number of points, and that both time and space must have some ultimate smallest element (i.e., he declares Democritus the victor once and for all in the debate with Aristotle). Many might demur. In any case, it is strange for the author to insist so strongly that infinities cannot exist when the cosmological model he invokes in Part One, as part of his evidential argument, asserts that the universe is finite in age but infinite in spatial extent along any time-slice. The argument that no infinity can exist proves too much—if it applies to time, it must also apply to space.

There are many useful arguments in this book, summarized or improved upon from other sources, including classical ones. But in trying to find irrefutable “proofs,” the author, like many following the same program, overreaches. The best of these arguments could be cast as evidential arguments that are quite powerful. If we do

not want to bring in actual experience analyzed inductively, all that I see pure logic providing us is the knowledge that there must be one uncaused (or “unconditioned”) cause in the universe that is eternal, a “ground of all being.” The debate between theists and atheists then becomes a debate about the nature of that ground of all being: is it personal or impersonal, loving or detached, living or machine-like? To resolve that we have to look at the actual universe, our experiences in it, and the claims to revelation given us.

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RELIGION & BIBLICAL STUDIES

ENGAGING THE CULTURE, CHANGING THE WORLD: The Christian University in a Post-Christian World by Philip W. Eaton. Downers Grove, IL: IVP Academic, 2011. 206 pages. Paperback; \$18.00. ISBN: 9780830839292.

It is fairly rare for a sitting president of a church-related college or university to write a book on the renewal of Christian higher education. It is even rarer for that president’s rhetoric in his book to coincide so neatly with the missional rhetoric of the school itself. And it is most unusual for a president to have read so widely in the literature of Christian higher education and to write so gracefully.

Happily, the reader is offered all that in a new book by the president of Seattle Pacific University, Philip W. Eaton. He has been president of that university since 1996 and is still going strong. A visit to the university’s website reveals a strong correspondence between the rhetoric of the book and that of the university. And a perusal of the book introduces the reader to many intellectual luminaries in an inviting way. The book is a good read.

The major concerns of the book are two: an ongoing analysis of what sort of challenges a robust Christian university faces, and an animating vision of what should fuel such a school as it meets those challenges. As to the first concern, the book does not stop with analyzing the challenges in the first few chapters. Even toward the end of the book, Eaton brings up yet another challenge of the sort that Stephen Pinker presents—that religion should shrink from public importance in the United States as it has in Europe (p. 175). But Pinker is just one in a host of people and movements that characterize post-Christian America.

Eaton draws on many theorists to elaborate the challenges a Christian college faces: John Henry Newman, Jaroslav Pelikan, Stanley Hauerwas, Stanley Fish, James Davison Hunter, David Brooks, Tom Wolfe, Charles Taylor, George Weigel, Cormac McCarthy, and T. S. Eliot, to name a few of the heavier types. As each commentator adds his voice in assessing the great obstacles to Christian higher education posed by modern culture, the reader can easily despair.

But Eaton certainly does not despair. His constructive words are a call to arms, a rallying cry, a confident summons to a doable task. Drawing upon the great gospel

story of redemption refracted through St. Paul, Eaton articulates his animating vision for the mission of the Christian university.

To announce—right in the face of suspicion and absence of trust—redemption and healing and love to a broken world. Such an announcement is guided by the trusting embrace of a story that gives coherence and meaning to the chaos we experience daily. We have such a story to offer ... But should this be the mission of the university? My answer is decidedly yes. Of course. We must organize our work as a Christian university around this story of healing and redemption, hope and joy. We must come off the margins of our culture, effectively and winsomely, to make such an announcement. (p. 184)

That is the flaming center that animates the university and its people—administrators, faculty, staff, students. Certainly that flaming center has to be refracted through imagination, theological articulation, and engagement with the culture, represented in any university by its secular fields. Eaton moves his argument along by relying heavily on the biblical study and theology of N. T. Wright.

When enough people are committed to this mission, a “grace-filled” community will emerge that will realize human flourishing right in the university, but then spill it into the world in a transformative way. The university is called to change the world. No small vision here.

How do we assess the work of this exuberant leader of a Christian university? He certainly offers a robust and exciting vision for the Christian university. A close look at the Seattle Pacific website indicates that the vision does indeed animate the university Eaton leads. One almost believes that the vision and the university are first steps in overcoming and triumphing over the great obstacles he elaborates early in the book. But I kept thinking that his articulation of that vision sounds more like the mission of the church than the mission of the university. Certainly this idea of a Christian university must enlist only fully committed Christians of a certain venturesome sort as administrators, faculty, and students. It assumes not only a believers’ church, but also a believers’ college.

I applaud such a vision—as well as such a university—but wonder if a more modest vision might be more appropriate for other universities, one that focuses more on forming the mind than the heart. I think that nurturing students in the Christian intellectual and moral tradition and then helping them engage that tradition with the various secular fields are sufficiently ambitious goals for the Christian university. Likewise, more modest goals with regard to the world might be more fitting. I would be happy enough to prepare students to exercise their Christian vocations as salt and leaven in God’s wounded world. “Changing the world” is a pretty daunting task if one takes seriously the challenges the author himself lays out.

One should not read the book for practical advice about how one puts the author’s vision into practice. He stays pretty much at the inspirational level. But it certainly is inspirational.

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ECOLOGY AND THE ENVIRONMENT: The Mechanisms, Marrings, and Maintenance of Nature by R. J. Berry. West Conshohocken, PA: Templeton Press, 2011. viii + 232 pages. Paperback; \$19.95. ISBN: 9781599472522. E-book; \$9.99. ISBN: 9781599473994.

Robert James “Sam” Berry (born 1934), emeritus professor of genetics at University College, London, honored with the UK Templeton Award (1996) and the Marsh Award for Ecology (2001), is well qualified to write authoritatively on environmental issues, having authored or edited numerous books on natural history and on science and Christian faith. He has led many organizations, including the European Ecological Federation and Christians in Science. *Ecology and the Environment* is the ninth in the Templeton Science and Religion Series, for a general audience interested in science and the humanities, including religion and theology. It seeks to inform readers without a scientific background about ecological concepts, that they may know more about the world on which all depend, getting them to ask the crucial question of how we ought to treat this world. The eight chapters range over a variety of topics much wider than the title implies.

The opening chapter “Ecology—The Study of Place” starts with a list of twenty important ecological concepts, which would be obscure to readers without some ecological background. It then switches from ecology to review Earth’s history, from the origin of life, through the formation and breakup of supercontinents Rodinia and Pangaea (incorrectly called Rodinia on p. 19), to the emergence of *Homo sapiens*. Ecology becomes central in the second and longest chapter, “A Green Machine,” in which a cryptic discussion of the concept of an ecosystem precedes a treatment of standard ecological topics, including adaptation, industrial melanism, the Galapagos finches, niches, and food webs. The sixteen figures, mostly from the research literature, which illustrate these two chapters, show that a solid basis of data undergirds the general statements in the text; however, specialized knowledge is needed to understand the details of most figures, and some of the labels contain errors. Similarly, an account of population growth briefly introduces the exponential, logistic, and Lotka-Volterra equations, but the connection between the name and equation seems mixed up in places, and needed parentheses in some formulas are missing. Introductory texts on environmental science for undergraduates express the key ideas with simple graphs of J-curves and S-curves and avoid the differential equations, which are unlikely to be intelligible to this book’s target audience. To get a clear presentation of these equations one must look elsewhere, for example, lectures 4, 5, and 19 of the third-year Biomathematics course at the University of British Columbia, <http://www.zoology.ubc.ca/~bio301/Bio301.html> (accessed February 2, 2012). Thus by the end of chapter two, this book has discussed nearly all of the twenty most important ecological topics previously identified.

The next three chapters bring insights from Christian faith to complement the preceding essentially scientific

presentation. Chapter three, “From Deluge to Biogeography,” documents the change in perception of the world from the static view of natural theology to the modern dynamic view of change governed by natural laws. Unfortunately, a key quotation from William Whewell has its sense erroneously negated by the omission of “not” before “by insulated interpositions of Divine power” (p. 74). In the early modern period, believing scientists gradually changed their interpretations of the biblical account of Noah’s ark. Likewise, there has been improved understanding of the distributions of plants and animals, especially endemism in island biotas where the founder effect is significant. Chapter four, “Stewardship and Ecological Services,” opens with concepts of the relationship between humans and nature in the Judeo-Christian tradition and in Islam, including a thoughtful critique of the lecture “The Historical Roots of Our Ecologic Crisis” by Lynn White Jr., given in 1966 (not 1956 as stated on p. 103). The contemporary advocacy of a biocentric worldview instead of a human-centered one finds expression in the deep ecology of Arne Naess and the Gaia hypothesis of James Lovelock. Nevertheless, ecosystem services such as primary productivity and water purification are of great value to people. In chapter five, Berry traces environmental literacy from the sixteenth century through to influential writers in the twentieth century such as Aldo Leopold and Thor Heyerdahl. However, he does not address literacy in the sense of improved understanding of environmental issues by the public and by decision-makers.

In the final chapters the focus turns to humanity and our place in God’s creation. Chapter six, “The Proper Study of Mankind,” first reviews human evolution from *Sahelanthropus* and *Australopithecus* to anatomically modern *Homo sapiens* with brains and larynxes allowing language. It then continues with a discussion of how morality originated, ending with the suggestion that at some time God brought about a transformation to a spiritually distinct “*Homo divines*.” With our unique abilities, humans are now “The Most Dangerous Species” (chap. 7) in the world, appropriating 45% of their net primary productivity (NPP) for themselves. Some communities, such as Easter Island, have collapsed after overexploitation of resources. Berry then catalogs thirteen conferences, programs, and declarations on these issues, starting with *Limits to Growth* in 1972 and continuing to the present. He reports findings and recommendations of the Earth Charter (1997), the Millennium Ecosystem Assessment (2005), and the International Covenant on Environment and Development (2010), and then he turns to a discussion of theological reflections by J. Moltmann and H. Küng. In the final chapter, “God’s Two Books,” after affirming the scientific validity of modern evolutionary theory and genetics, Berry shows how it is also entirely logical to believe in God as Creator and Sustainer, citing Old and New Testament scriptures. The Fall of humanity recorded in Genesis three brought death in the sense of “severance of relationship with God, the source of life,” physical death and suffering having existed long before the appearance of humans. Ecological damage is a consequence of disobedience by people without a proper relationship with God. The book ends with four pages of notes, suggestions for further reading, and a six-page index.

Berry keeps the interest of his readers by highlighting the contributions of great scientists and thinkers over the centuries, with many vivid quotations. However, the book lacks a sense of urgency. For example, it alludes to the problem of human population growth only indirectly, as an aspect of deep ecology or in the Earth Charter. Berry makes no suggestions of actions individuals can take to lessen the marring and improve the maintenance of nature. This book is more valuable for information on the history of ecological and evolutionary thought, and for the author's view of how science and Christian faith are integrated, than as a call to Christians for better stewardship of the environment.

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Letters

Biblical Longevities: Reply to Huebner

Donald A. Huebner, "Biblical Longevities: Some Questions and Issues" (*PSCF* 63, no. 4 [2011]: 287-8) has published a five-point critique of my article on biblical longevities, "Biblical Longevities: Empirical Data or Fabricated Numbers?" (*PSCF* 63, no. 2 [2011]: 117-30): two of his points are mistaken, and the other three do not relate to the content of the article but are based on what the article did *not* contain.

First, Huebner states that Table 1 is a "... listing of all generations from Adam to Manasseh." This is incorrect: Table 1 lists *longevities* (as the label states) not *generations*. The second paragraph of Huebner's critique is devoted to an argument that the table is not a satisfactory list of all generations; I agree with Huebner on this point because that is not what the table is intended or represented to be.

In his next paragraph, Huebner states, "The author ignores the clear lack of expected randomness in many of the entries of Table 1." This also is mistaken: the article addresses randomness, expected or otherwise, in the sections on the error distribution, statistical independence, Benford's law, rounding, and the systematic properties expressed by the equation for longevity. The rest of his paragraph consists of a discussion of various probabilities, but these points lack specifics (only one numerical probability is specified, and that one is incorrect), lack support by computations or other evidence, and lack awareness of the problems associated with post hoc probabilities. His use of an equation that yields longevities as though it yielded dates of birth, shows a misunderstanding of the points he intends to criticize.

Huebner objects that I failed to explain why some of the numbers are rounded and others are not, and that I did not cite evidence of the rounding of ages in the first millennium BCE. I acknowledge that I do not know why some were rounded and others were not, but I do argue that such is the case; and I also argue that the evidence of rounding contained in the article is sufficient.

Huebner would like to know how the longevities reported in other sources, such as the Septuagint, the Samaritan Pentateuch, and Josephus, affect my conclusions. Although I agree that it would be interesting to subject other sources to the analysis applied here, the outcome of such an analysis cannot affect my conclusions: if the results are the same, the conclusions, of course, are the same; if the results differ, it shows how the Masoretic sources differ from these other sources. Note, parenthetically, that I chose the Masoretic-based sources owing to the extreme measures the Masoretes used to promote accuracy (H. S. Miller, *General Biblical Introduction: From God to Us 2*, rev. ed. [New York: Houghton, 1960], 183-4).

Finally, Huebner objects that I did not address "... how the earliest genealogical numbers were accurately transmitted." However, I do not say that the numbers were accurately transmitted. My analysis simply provides evidence against fabrication as one particular source of inaccuracy. Errors may have arisen from many other sources, as Huebner points out. A particularly likely source of error that he does not mention may have arisen in the translation of numbers from hexadecimal to decimal notation, as pointed out by Philip Metzger (personal communication).

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Engineer and Scientist

The paper "Engineering Is Not Science" by Steven H. VanderLeest (*PSCF* 64, no.1 [2012]: 20-30) deserves comment that illuminates the role of "engineering" within ASA.

History yields some interesting anecdotes on the shifting boundary between science and engineering and associated terminology. In World War II, many scientists (mostly physicists) were recruited to help develop radar (an engineering function) at "radiation labs" at MIT and Harvard that helped win World War II.¹ After the war, these scientists went back to their scientific pursuits.

At Harvard at that time, there was a small engineering department, but in the post-war period there was a great expansion, focusing on the boundary between engineering and science somewhat in response to a large bequest from Gordon McKay in support of "applied science." Flexibility of language was illustrated by the breadth of departments claiming to be part of "applied science" including "social relations." Since then the new department was renamed eight times, including Department of Engineering Sciences and Applied Physics, Division of Engineering and Applied Sciences, and currently, School of Engineering and Applied Sciences (2008).

In my own career, I have played various roles including "engineer" and "scientist." I was in the Raytheon Research Division that applied "scientist" jargon to job titles, but in 1971 I made an important invention (engineering) after a colleague and I did some science on the subject (which would not have been permitted in an operating division). For the next 16 years, I was involved in