Evolutionary Science

THINKING ABOUT EVOLUTION: 25 Questions Christians Want Answered by Anjeanette Roberts, Fazale Rana, Sue Dykes, and Mark Perez. Covina, CA: Reasons to Believe Press, 2020. 343 pages, index. Paperback; $21.95. ISBN: 9781886653979.

As I accompanied a family member to a recent medical appointment, a nurse noticed I was reading a book on evolution, whereupon she immediately proclaimed that she did not believe such "fake news." When politely and gently asked to explain why she felt that way, she admitted she did not really know anything about evolution, but remained sure it was both wrong and dangerous. As an evolutionary biologist, I have, sadly, come to expect such interactions, which crystallize the urgent need for, yet at the same time the primary problem with, this dense, detail-packed book written by four diverse scholars.

Many bright, curious people like this nurse have heard little reliable information (and perhaps much misinformation) about evolution; many are people of strong faith, who understandably wish to avoid books written by scientists displaying outright hostility toward believers. The authors of *Thinking about Evolution* direct their writing to believers, but I expect most readers will not come away with a clearer grasp of what modern science says, and does not say, about evolution.

With 25 chapters covering a broad selection of topics from molecular genetics to archaeology, this book has lofty aims that are occasionally but not uniformly fulfilled. I found myself nodding in agreement almost as much as I vigorously shook my head in dissent or stunned disbelief, and I presume the book will likewise prove equally enjoyable yet frustrating to most readers. There is much to admire here, from the focus on evidence and the authors' humble admission that they may be wrong (they pledge to "follow the evidence wherever it leads"). The commendably wide array of topics befittingly emphasizes philosophy, and the authors wisely stress not just scientific findings but the importance of defining terms, abductive reasoning, and rhetorical language in the acceptance or rejection of evolution.

The authors are candidly up front about "outing our bias" as progressive/old-earth creationists: the fundamental standpoint of Reason to Believe (RTB). According to this scheme, "material stuff in the universe" was created either directly via divine fiat, or, as in the case of "galaxies, stars, and planetary systems," through "secondary causal events [via] physical laws established in the initial creation." RTB's position limits the role of "secondary" unfolding on living systems. Throughout the book, the authors emphasize that they oppose, and sharply criticize, theistic evolution/evolutionary creation (TE/EC).

Scores of references and helpful figures reflect thorough research, with 25 chapters posed as questions, some highly specific (Did Neanderthals create art?), others weakly generic (What's philosophy got to do with evolution?). Authors display familiarity and in many respects mastery of material, but they seldom do justice to all topics or fairly represent science; their prejudice shows in such statements as an "evolutionary view … encourages many injustices and social ills we see in our world today."

Chapters on molecular genetics and biochemistry (by Roberts and Rana, respectively) are remarkably comprehensive and fact-filled, perhaps too much so, given that the depth of detail (on epigenetics, horizontal gene transfer, tandem repeats) will likely overwhelm casual readers. Chapters on macroevolution and paleontology are much weaker and less objective, betraying strong biases and employing stale creationist tropes about "irreducible complexity" and indemonstrable phenomena. There is notable fretting, demonstrating infuriating lack of understanding, about "large-scale" evolution, as authors insistently hawk weak claims about progressive stages and driving forces of evolution. Notions equating evolution with progress are common outside science but demonstrate startling ignorance of scientific consensus, as do ideas about Platonic essentialism and straight-line advancement. There are many false claims about a supposed lack of transitional forms, plus confusion about what might constitute a transitional form: in short, every species! By analogy, we all agree that children descend from, and sometimes closely resemble, their parents, but where are the transitional intermediates?!

The authors seem not to have considered the basic, widely accepted view of biodiversity as bush-like rather than ladder-like, nor that many diverse species of hominins, early tetrapods, and early whales existed concurrently, or that some species persisted as new ones appeared. As George Williams pointed out, there are good reasons why many ancient plant and animal descriptions still apply. Millennia are a mere drop in the bucket of geological deep time

(admittedly incomprehensible on a human scale); second, natural selection generally culls outliers and preserves the status quo, at least in the absence of environmental change. This explains an apparent stasis of many species, and cladogenic speciation explains why older species can persist over long spans even as new species arise.

As is often the case with evolution critiques, some criticisms hit the mark. I daresay crucial points could chasten agnostic or even atheistic scientists. Expert educators will enjoy the trove of technical details. Discussion of whether biochemical data are analog or digital is fascinating, but the obsession with life's origins (not strictly a topic of evolution) is tiring. Yes, evo-devo is still in its infancy, but it readily explains how tiny molecular tweaks produce huge phenotypic changes, and how convergence is predictable.

More troubling than any answers the authors provide are obvious questions they omit, including key queries at the heart of current evolutionary exploration, including rates and levels of evolution. What is a species? Can we recognize them over time? How rapidly does evolution occur? What about group selection?

The authors admit evolution is a paradigm consistent with countless observations, yet send mixed signals concerning its reliability. They affirm microevolution as factual while seemingly disavowing that science has facts. They provide a solid primer on philosophy and the nature of science, but fail to recognize key distinctions between methodological and ontological naturalism. They explain that falsification is a key to science, yet fail to show how simple findings could falsify evolution (organisms with non-nucleic acid genetic codes, problematic chronology, discordance of genes and phenotype). We "learn" that Neanderthals were nothing like modern humans and they could not have created art, which apparently would threaten human uniqueness, even though dozens of previous claims of exceptionality (e.g., humans as sole tool makers or users) have quietly disappeared without consequence.

I found much to like in this volume, but it is perhaps fitting that my feelings were ultimately mixed. The alternatingly detailed and vague explanations, and blend of modern and stunningly out-of-date findings, contribute to an overall feeling of mixed messaging, as do specific claims made throughout the book. The authors frequently argue that evolution is not goal-driven, then (in other passages) state that evolution must have a driving purpose. Their treatment of macroevolution reveals a strong teleological bias, despite a notably good section on why science avoids teleology. In places, there appears to be a steadfast denial of any role for evolution in generating biodiversity; nonetheless, there are occasional bold statements such as "Does microbial evolution occur? You bet it does!" Together, these contribute to an uneven hodgepodge of chapters and eventually to an unbalanced if unsurprising assortment of conclusions (microevolution good, macroevolution impossible).

The upshot is that it is ultimately difficult to know just whom the book is pitched at. It is hard to imagine the target audience, except perhaps for the nurse I encountered: smart, literate, curious people who (I imagine cynically) seek scientific "reasons" to validate their gut rejection of evolution. The authors appear to give the game away a quarter of the way through the book: "Does evolution stand as a threat to Christianity? It depends on your beliefs." Truer words were never written, and that admission distills the main issue, and shortcoming, of this jampacked tome, stuffed with an array of overpowering detail that nonetheless seems aimed at minds already made up. If you are unlikely or unwilling to accept the truth of evolution, as is occasionally the case for devout followers of any religious faith, then no amount of scientific elaboration will change your mind. Conversely, if you are comfortable with evolution, then you might (as I did) find much to ponder here but little to alter your view.

Sadly, the book readily exhibits typical creationist flaws. Given their scientific training, it is unfortunate that the authors do not accept (or at least admit) that science is a work in progress which does not claim to hold immediate answers to all current questions, or that disagreements among scholars and revised ideas based on new evidence demonstrate healthy potential. I applaud the authors' bluntly stated insistence on approaching this fraught topic with open minds—a refreshing and truly admirable admission, although, I regrettably fear, not an honest one. The authors are welcome to embrace creationism, but I worry that it precludes them from giving evolution an honest accounting. Readers will have to judge if the authors present a good faith effort to accurately reflect modern science, or if their preconceptions limit their judgment of current evolutionary thinking. Alas, I vote for the latter.

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Environment

SCORCHED EARTH: Environmental Warfare as a Crime against Humanity and Nature by Emmanuel Kreike. Princeton, NJ: Princeton University Press, 2021. 538 pages. Hardcover; $39.95. ISBN: 9780691137421.

In *The Abolition of Man*, C. S. Lewis writes, "What we call Man's power over Nature turns out to be a power exercised by some men over other men with Nature as its instrument."[1] Lewis wrote this decades before the fields of environmental history and political ecology became popular; these topics now challenge our tendency to conceptualize nature and culture in dualistic or binary terms, but he understood that it is impossible to separate power over nature from societal power.

In *Scorched Earth: Environmental Warfare as a Crime against Humanity and Nature*, Emmanuel Kreike shows that nature is always an instrument and a victim of war. He argues that scholars conceptualize war as an act of genocide (the intentional effort to destroy a whole nation or ethnic group) or ecocide (the destruction of an ecosystem or species). But this dualistic frame misses the complex reality of warfare that often amounts to what he calls environcide: "intentionally or unintentionally damaging, destroying, or rendering inaccessible environmental infrastructure through violence" (p. 3).

The temporal and spatial scope of *Scorched Earth* is impressive. Temporally, Kreike begins with the early sixteenth-century Dutch Revolt and ends with the First World War. Spatially, he ranges from conflict in the Low Countries of Europe to Spanish conquest of the Americas. Throughout, he shows that, in Western warfare, parties have consistently targeted environmental infrastructure, leading to lasting impacts on both societal and ecological patterns.

Chapters 1 and 2 recount the Dutch Revolt and the Spanish Conquest of America, both in the sixteenth century. Chapters 3 and 4 tell the stories of the Thirty Years War and European conquest of America in the seventeenth century. Chapters 5, 6, and 7 outline the War of the Spanish Succession, the War of the Austrian Succession, and European colonialism in the eighteenth century, when the principles of limited war were adopted by many European nations. Chapters 8 and 9 explain American westward expansion and Dutch conquest of Indonesia in the nineteenth century. Finally, chapter 10 shows that Portuguese colonial conquest and the First World War continued environcidal practices.

Scorched Earth makes several important contributions. Like other environmental histories of warfare, *Scorched Earth* shows the horrors of war for both people and the nonhuman environment. But the sweep of *Scorched Earth* offers something new. Kreike shows that warring parties have consistently destroyed environmental infrastructure—fields, homes, dams, houses, irrigation networks—in order to sustain themselves and to starve their opponents of critical resources or terrorize their opponents into submission. This altered both social/economic practices and ecological processes, often leading to migration, famine, disease, and depopulation. Often attributed to forces of nature, these tragedies are shown by Kreike to be more accurately attributed to environcide.

The sweep of Kreike's analysis also shows the vast gap between the rules of war and the practice of war. Beginning in the eighteenth century, armies adopted strict rules prohibiting rape, looting, and violence against civilians. Repeatedly, these practices continued. *Scorched Earth* expands our understanding of war's collateral damage by emphasizing the destruction of environmental infrastructure alongside more-direct human atrocities.

The sweep of the book does create some challenges. For example, in some chapters, Kreike's detailed accounts demonstrate his argument convincingly. In other chapters, readers must trust his analysis through impressionistic accounts. But taken together, the ten chapters make a compelling case.

The more significant question in *Scorched Earth* is the value of the term "environcide." Kreike uses it in part to challenge the notion that "total war," namely, war in which "anything and everything is the object, subject, and means of war" (p. 17), is exclusively a modern phenomenon or dependent on weapons of mass destruction. In this, he certainly succeeds. But in parts of the book, then, environcide is essentially a synonym for total war:

> Environcidal war was total war that triggered famine, disease epidemics, massive population displacement, and the devastation of people's livelihoods and ways of life and was as destructive to humanity as it was to Nature. The history of total war as environcide highlights … [why it] should be condemned as a crime against humanity *and* Nature. (p. 417)

This is a valuable insight that helps us understand how destructive warfare is of both humans and nonhuman nature.

Yet he also introduces the term to mean something broader than total war, namely that warfare with limiting rules of engagement still destroys environmental infrastructure that people need to rebuild after a conflict. Using it this way suggests something so broad that it is difficult to imagine any warfare that does not constitute what he describes as "a crime against humanity *and* nature." To the extent that international law does not treat all warfare as criminal, environcide clearly needs boundaries.

But the problems highlighted above are minor in evaluating *Scorched Earth*. It is a remarkable work of scholarship that should make its way into every graduate course on the history of military conflict.

The book has enormous value in thinking critically about contemporary warfare. All United Nations member states are signatories to the Geneva Conventions, which are intended to protect civilians, other noncombatants, and prisoners of war. If followed, the conventions would ensure that signatory nations do not carpet bomb cities as the United States did in the Second World War, deploy the kind of chemical weapons used in the First World War, and summarily execute prisoners. Appealing to these conventions lets civilian and military leaders tell their citizens that they engage in limited war with minimal collateral damage. Kreike's analysis should make us question the meaning of limited war which invariably causes direct human collateral damage and indirect human collateral damage caused by the destruction of environmental infrastructure. Indeed, *Scorched Earth* demonstrates that, however compelling just war theory might be in concept, fully just prosecution of war does not happen in practice.

The book also helps build the conceptual framework needed for Christian reflection on sustainability. Christian theologians and ethicists, particularly since Lynn White Jr.'s 1967 essay "The Historical Roots of Our Ecological Crisis," have challenged dualistic thinking about humans and the nonhuman environment. Kreike's descriptive analysis deepens our understanding of human embeddedness in the nonhuman creation, showing that Christian ethics itself should not be bifurcated in any simple sense between *social* ethics and *environmental* ethics.

Note

[1]C.S. Lewis, *The Abolition of Man* (New York: HarperCollins, 2001), 55.

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History of Science

GEOGRAPHIES OF KNOWLEDGE: Science, Scale, and Spatiality in the Nineteenth Century by Robert J. Mayhew and Charles W. J. Withers, eds. Baltimore, MD: Johns Hopkins University Press, 2020. 272 pages. Hardcover; $54.95. ISBN: 9781421438542.

Around the 1970s, historians began embracing what came to be called the "constructionist" view of the development of scientific knowledge, which emphasized the particulars of local circumstances, people, and politics. On this view, scientific knowledge is thus constructed, not discovered. This process, moreover, is not the work of the individual genius but manifestly a communal and cooperative enterprise. The social construction of science thus denotes the view that scientific knowledge is not solely an autonomous, rational human production, but, rather, tangled directly to social interests and conditions. Influenced by the broader postmodern rejection of unmediated knowledge, the social constructivist relativization of scientific knowledge had direct implications for the way in which one defined the relationship between science and religion, in that it has forced scholars to stop privileging the scientistic narratives of conflict with faith, and thus challenged prevailing grand narratives of scientific progress, most conspicuously promulgated by George Sarton, often considered the father of the discipline of the history of science.

Historian and sociologist of science Steven Shapin has been one of the leading practitioners of constructivist historiography. In now a celebrated article, Shapin argued that the early man of science "did not occupy a single distinct and coherent role in early modern culture." Everywhere the social role of the man of science was heterogeneous, the pursuit of natural knowledge adventitiously attached in all sorts of ways to preexisting roles.

The notion that science and scientists are not isolated from their wider cultural context had enormous consequences. Critical theorists and sociologists of knowledge like Shapin offered a helpful corrective, revealing a kind of dialectic where science, literature, and culture are understood to borrow freely from each other. Focusing less on the structure than ethos of scientific communities in the early modern period, Shapin relativized and localized the central figures, themes, and institutions of the so-called scientific revolution. Shapin's scholarship, and those who

followed his lead, provide a useful background for the emergence of issues of the culture of knowledge in the nineteenth century. What is particularly unique about the nineteenth century is that direct access to knowledge, through popular, cheap, and readable texts, became a central factor in both the production of knowledge and the structuring of social order.

Shapin called historians of science to take up the task of providing a more "contextualized" historiography of the history of science. Since then, there has been much progress in putting science in its place. This "spatial turn," if you will, in the history of science is paradigmatically reflected in the corpus of David N. Livingstone, which the current volume under review almost serves as a Festschrift. Early in his career Livingstone recognized that "science is not a disembodied entity; it is incarnated in human beings," and that "science is not some eternal essence slowly taking form in history; rather it is a social practice earthed in concrete historical and geographical circumstances." In his well-written small book, *Putting Science in Its Place: Geographies of Scientific Knowledge* (2003), Livingstone set out to evince scientific knowledge and practice as deeply embedded in specific times, places, and local cultures—science, in fact, is always "a view from somewhere." Space matters, according to Livingstone. Space enables and constrains us; dictates what we can say and do; allows only a range of possible, permissible, and intelligible utterances and actions. This is Livingstone's notable emphasis of "location and locution": the positions we speak from are crucial to what can be spoken.

Scientific knowledge is thus not immune to the vicissitudes of culture. According to Livingstone, "What is known, how knowledge is obtained, and the ways warrant is secured are all intimately bound up with the venues of science." Investigating the local, regional, and national features of science means that science is not to be thought of as some transcendent entity that bears no trace of the parochial or contingent. "We must work," writes Livingstone, "with a less fixed conception of what science is." What passes as science is contingent on time and place; it is persistently under negotiation. After all, science is a human enterprise: "it is not some preordained entity the fulfilling an a priori set of necessary and sufficient conditions for its existence; it is a human enterprise, situated in time and space."

Science, then, is not just a collection of theories and universal truths but a concrete practice with spatial dimensions. It is, indeed, situated knowledge. The editors of *Geographies of Knowledge* have gathered a collection of essays that build on themes in Livingstone's impressive work. Structured in three parts, focusing on local, national, and global studies. Robert J. Mayhew and Yvonne Sherratt, for example, offer a "spatial hermeneutic" of Thomas Malthus's *Essay on the Principle of Population*, arguing that it was a work grounded in "local knowledge," with each edition revealing autobiographical particularities (p. 51). Diarmid A. Finnegan then revisits the place of Belfast in examining John Tyndall's infamous "Belfast Address" of 1874. Although the address has attracted considerable scholarship, Finnegan insightfully brings out further nuance by emphasizing the "plurality of place," exposing how religious and political changes in Belfast reflect the contrasting responses to his work (p. 79).

Turning to more national studies, American church historian Mark Noll examines Swiss defender of slavery Henry Hotze and how he used a rhetoric of conflict between science and religion to support scientific racism (p. 108). Veteran historian of science and religion Ronald Numbers reiterates his approach to the evolution debates in America, followed by yet another warning of the rise of global creationism (p. 132). Next comes Nicolaas Rupke's "structuralist" method in analyzing the early "nationalization" of evolutionary theories, particularly in its Nazi appropriation (p. 150).

The concluding global section has an interesting piece by Charles Withers on the establishment of an internationally accepted Prime Meridian, in which he shows that the meetings of the International Geographical Congress "cannot be divorced from its wider intellectual and political context" (p. 178). This is followed by case studies on amateur naturalist and illustrator Charlotte Wheeler-Cuffe by Nuala Johnson, the situated nature of early climate science in the British Empire by Vinita Damodaran, and a study of failed British expeditions of West Africa by Dane Kennedy. An Afterword by John Agnew cogently summarizes the entire volume, illustrating in particular how Livingstone's impressive scholarship reflects his own variegated background as an Irish Presbyterian, historical geographer of science extraordinaire!

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Medicine and Health

CALLED TO CARE: A Christian Vision for Nursing by Judith Allen Shelly, Arlene B. Miller, and Kimberly H. Fenstermacher. Downers Grove, IL: IVP Academic, 2021. 328 pages. Paperback; $32.00. ISBN: 9781514000922.

The third edition of *Called to Care* details a rich biblical foundation and Christian worldview for nurses seeking to integrate their faith in nursing practice. Co-author Kimberly Fenstermacher joined Judith Shelly and Arlene Miller in this recent edition. The focus of the third edition remains similar to the last two, the authors detail a broad nursing metaparadigm and articulate the relationships between person, environment, health, and nursing practice.

I work at a Christian college in the Midwest and nursing faculty have adopted the second edition of *Called to Care* within the undergraduate Bachelor of Science in Nursing curriculum for several years. I was very excited to read the third edition of *Called to Care* to discover what is new in this edition. I believe that this book, as do the previous two editions, delivers a compelling biblical understanding for the nursing profession. The subtitle of the third edition changed to *A Christian Vision for Nursing* from *A Christian Worldview for Nursing*. As I read this book through a nursing lens, I felt a deep unwavering connection between Christian faith, scripture, and the everyday responsibilities, ethics, and expectations that are unique to the role of the nurse.

The authors explored new topics related to cultural competency, palliative care, and addressed recent changes within healthcare and the impact on the profession. Furthermore, the authors continue to help readers apply information in practical methods offered through revised and updated chapter objectives, theological reflective questions, and the use of case studies and discussion questions at the end of each chapter. These resources are easy to integrate within nursing curricula and equip nursing faculty and students to seek out holistic nursing care—caring not only for the physical needs of the patient, but also the mind, spirit, and soul.

Shelly, Miller, and Fenstermacher expand on culture in this new edition, providing nine meaningful guidelines to help nurses relate to their clients cross-culturally. These principles encourage self-reflection, lifelong learning and research, and a personal connection and relationship with God. Furthermore, the authors emphasized walking alongside Jesus in preparation for the draining physical, emotional, and psychological toils of the nursing profession. How do nurses keep attending to the sick when they cannot see physical improvement in patients? Shelly, Miller, and Fenstermacher emphasize that only through Christ can nurses find realistic hope in the face of suffering and death. As the nursing profession struggles with high acuity patients, limited resources, compassion fatigue, and burnout, the authors encourage and remind readers that many nurses feel compelled to enter the profession to serve God and are willing to embrace suffering to fulfill this purpose. Additional reassurance is offered through examples of how nurses delight in and find joy through interpersonal relationships with patients and colleagues. Finally, another inspirational strength that Christian nurses should seek to demonstrate is the resilient ability to think broadly, considering progressive opportunities that can arise out of difficult situations. Christ-centered nurses embrace risks and courageously focus their efforts on change that can positively enhance the profession and better patient care despite a complex and ever-changing health care environment.

Shelly, Miller, and Fenstermacher casually discussed caring for individuals who identify as lesbian, gay, bisexual, transgender, or queer (LGBTQ). The authors suggest that nurses care for all people with respect, sensitivity, kindness, compassion, and understanding but leave no guidance for teaching this topic in Christian higher education. Nursing faculty are navigating difficult terrain as many are uncertain if they have the support of administration when speaking of these conflicting Biblical perspectives. Nursing faculty are required to teach on this topic as some students have already encountered and cared LGBTQ individuals in clinical practice. For example, a maternal newborn clinical rotation left students, faculty, and nursing staff in a puzzling situation. A student cared for a client who identified herself as male and just had a baby. This client requested that all healthcare staff refrain from identifying the newborn as male or female, as the client and partner felt that it was best for the baby to choose which sex they most closely identify with once he or she is older. While this was a perplexing situation for many faculty and students and there was little guidance from nursing staff on the unit. As this topic continues to filter into diversity initiatives, nurses must be equipped and confident to navigate controversial topics with a sound moral Christian foundation. A more substantive section on these issues would have been a helpful addition to this edition.

This book has challenged me to critically evaluate how I integrate faith inside the classroom. Moreover, the authors have deeply moved and inspired me to grow intimately in my relationship Christ. I highly recommend this book to nursing faculty, students, and to all nurses that have devoted their life to Christ and seek to be in constant relationship with Him. The message within this book softens calloused hearts and motivates nurses to view each client as created in the image of God.

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Science and Religion

SCIENCE AND THE CHRISTIAN FAITH: A Guide for the Perplexed by Christopher C. Knight. Yonkers, NY: St. Vladimir's Seminary Press, 2020. 232 pages. Paperback; $22.00. ISBN: 9780881416718.

Christopher Knight holds a PhD in astrophysics, serves as a priest of the Orthodox Church, and is a Senior Research Associate of the Institute for Orthodox Christian Studies in Cambridge, England. His two previous books also examined the relationship between science and Christian theology but were aimed at a broad academic theological audience. This book however is "aimed specifically at an Orthodox audience and focuses on the kinds of questions that I find are often asked in Orthodox circles" and "is aimed, not primarily at academics, but at the ordinary, intelligent believer whose formal education may have included neither science nor theology at an advanced level. For this reason, it does not attempt a comprehensive survey of the work of others engaged in what is sometimes called the science-theology dialogue" (p. 17). As he states in his Afterword, "My hope and prayer is that what I have written here may be a contribution to that development, both for the theological scholars of our Orthodox community and for the ordinary believer" (p. 226).

These facts on their own do not mean that the book cannot be of value for a non-Orthodox audience. I myself have learned a great deal from Patristic thinkers and have often used their ideas in my own apologetic work. Nonetheless, I do feel compelled to clarify two things for other readers. As the book is written for an Orthodox readership, it does presume a baseline understanding of Orthodox theology and history: the text is sprinkled profusely with the names of Orthodox thinkers and Orthodox theological/philosophical terms. More importantly, though, I found the title of this book (and its description on Amazon) to be misleading. It is less about the relationship between science and the Christian faith in general, and more about how the Eastern Orthodox Church has navigated that relationship differently (and apparently in Knight's view, better) than the Western church. In effect, it is less a defense of Eastern Orthodox thinking before a Western audience, and more a critique of Western thinking before an Eastern audience. This perception became quite evident in the Afterword:

> Throughout this book, I have been critical of the way in which the Western science-theology dialogue has developed over the past half-century … We cannot ignore those questions [raised in the science-theology dialogue], nor can we ignore the answers that have been proposed by Western scholars, even when we judge them (as I do) to be inadequate or incomplete. (p. 223)

There is an element of pejorative in Knight's referring to the Western scholars as "our younger brothers" (p. 223). In fact, Knight seems to perceive intra-ecclesial conflict or competition in his view of the trajectory of the dialogue between faith and science over the past two millennia. After applauding the Orthodox church for maintaining engagement with science while the West dropped the ball during the first millennium, he acknowledges that the roles reversed during the second millennium. He details how world historical events (including the rise of the Ottoman Empire, Russian politics, and the French Revolution) caused Orthodox thinkers to distance from and become suspicious of secular science, while only the Roman Catholic Church in Italy continued the push to harmonize science and faith (pp. 42–44). Finally, he concludes his description of that trajectory with the following:

> In the Western theological community, a rich 'science-theology dialogue' has existed for over half a century … a comparable dialogue has only begun more recently in the Orthodox world. (p. 44)

> … around the middle of the twentieth century our Orthodox theology—through the "neo-patristic" movement—finally escaped from its reliance on those Western Christian philosophical and theological frameworks which had, up to that period, strongly influenced our theological thinking for several centuries … there can be no doubt that the scholars who led this attempt to escape our "Babylonian captivity" have performed an extremely important task. (p. 159)

So, how does Knight see Eastern thought doing a better job exploring faith, science, and the relationship

between the two than that in the West? Knight identifies several ways. First and foremost, the Orthodox community did not lose sight of science during the first millennium the way that the Western church did and had to rediscover science through the Muslim world (p. 38).

Second, Orthodox thinking is more influenced by the Patristic tradition of reading the scriptures allegorically and anagogically rather than "literally" as Western fundamentalists do (pp. 46, 61). The difference in outcomes between these two approaches is exceptionally evident when considering the creation story, and Knight claims that the questions being raised "in the Western science-theology dialogue can be answered more satisfactorily when explored through the Orthodox Tradition than it has been in the Western context," in large part because the former has a such a rich and nuanced theology of creation (p. 51).

Third, in his chapter which explores the mind of the Patristic Fathers, Knight compares and contrasts approaching theology experientially and through mysticism (Eastern) rather than through reasoning and certainty (Western); the Eastern approach to theological and scientific knowledge through contemplation (*theōria*) of the intellect (*nous*) is superior to the Western approach of gaining knowledge (*gnōsis*) through reason (*dianoia*) (pp. 58–66). In several other places in the book, Knight refers to most Western thinkers as having a poor understanding of the *nous* or as seeing no value in the concept (p. 120).

Fourth, the Orthodox view of original sin is not the Augustinian one that has so influenced Western theology (in a footnote, he points particularly at Calvinism). One outcome of this is that the *imago Dei* has not been destroyed (Western) but distorted (Orthodox), and as such the capacity to know God at an intuitive level is not obliterated (Western) but only eclipsed (Orthodox) (pp. 56–66). Another outcome is an entirely different understanding of the first humans being clothed by God in animal skins after they had sinned (chap. 11) and mind-body dualism (chaps. 6 and 7). The work of many Western theological scholars in trying to understand the human mind is criticized as being overly simplistic and aligning too closely/easily with that of secular scholars (p. 118); the latter focus too much on how mind emerges out of matter, while the Orthodox recognize that matter emerges from the mind of God (p. 124).

Fifth, "Orthodox theology has avoided the Western tendency either to separate God from the world or else to make no proper distinction between them," but instead maintains the "… sense of God's being in all created things and yet utterly transcending them" (p. 143; also see pp. 156–57, 160). This underpins his later discussion of miracles (from the creation account to the modern day): while Western thinking sees these unusual events as "supernatural" and as breaks from "the normal," Orthodoxy sees the everyday present as "sub-natural" and those unusual events as nature and its constituents inexorably being drawn back (or drawing themselves back?) toward "the normal," toward the original *telos* of all creation which had been distorted by humans (pp. 19–20; also chap. 12). It also underpins his criticism of Western thinking on mind-body dualism for capitulating to reductionist materialist thinking and ideas such as emergence, rather than the Eastern concept of vitalism: "some kind of substance (in the philosophical sense) being added to the basic building blocks of nature in order to give rise to life and what is to be human" (pp. 102–7).

My assessment of this book is from the position of an outsider (one of the "Western scholars") who accidentally stumbled into an in-house discussion because of the book's misleading title. From this perspective, I fully agree with Knight that Eastern Orthodox thinking has made a valuable contribution to the faith-science dialogue. In particular, their emphasis on a more allegorical approach toward scripture, and a more mystical approach toward theology and the human-divine relationship. The Western emphasis on literalism, certainty, logic, and "personal relationship" has produced all kinds of problems for Christian theology, for the day-to-day Christian spiritual experience, and for our relationship with science. Moreover, on some of the other points that I listed above, I think the "superiority" of the Eastern approach depends on one's worldview: it certainly works better if you adhere more specifically to an Eastern theology, but not so much if one holds a Western theology, in precisely the same way that a "literal" reading of scripture works perfectly well if one is a young earth creationist but not so much if one is an old earth creationist.

In conclusion, this book will be an excellent resource for those readers who intend to gain a deeper understanding of the Eastern Orthodox perspective and theological/hermeneutic approach. But for those who are committed to a Western theology or simply want to learn about "Science and the Christian

Faith," I expect they will find this book hard going and possibly disappointing.

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Science in Society

SCIENCE DENIAL: Why It Happens and What to Do about It by Gale M. Sinatra and Barbara K. Hofer. New York: Oxford University Press, 2021. 208 pages. Hardcover; $35.00. ISBN: 9780190944681.

Science denial and scepticism are not new; however, the COVID-19 pandemic has brought the issue to the fore with an importance and an intensity that seems unmatched in recent history. While Galileo's theorem that the earth rotated around the sun may have shaken up the church and intelligentsia, it did not have the widespread effect on the daily lives of average people in the same way as COVID-19 vaccination or mask-wearing have had.

In their book, *Science Denial: Why It Happens and What to Do about It*, Gale Sinatra and Barbara Hofer draw on their own work, along with that of other experts, to attempt to identify the factors that influence science doubt and denial and to outline strategies for addressing these at individual and societal levels. Sinatra is Professor of Education and Psychology at the Rossier School of Education at the University of Southern California and Director of the Motivational Change Research Laboratory. Hofer is Professor of Psychology Emerita at Middlebury College.

As the authors point out early on, the book is unlikely to be read by "hard-core science denier(s)." It also is not solely aimed at scientists or academics, although it makes some very helpful points and can be useful to people actively engaged in scientific research and teaching. The authors state that the book is also aimed at readers who are interested in trying to understand how they themselves evaluate scientific issues, what cognitive biases they may have, and how to understand and interact with others who have different opinions or feelings about science or scientific issues. Most chapters end with calls to action addressed at individuals, educators, science communicators, and policy makers, with steps that can be taken to improve understanding and address science denial.

The book is arranged in two sections. The first section addresses the current situation, sets out definitions for science denial and doubt, and addresses two important venues where individuals obtain information about science in general and specific issues in science: the online world and science education. The second section delves into the psychology of science denial: cognitive bias, epistemic cognition (ideas about knowledge and knowing), motivation, emotions, and attitudes.

The first chapter outlines several aspects of science denial in the modern context, outlining the role of science and scientific advances in modern life and touching on some of the pertinent scientific issues of the time: climate change, the dangers of smoking, genetically modified organisms, and of course, the COVID-19 pandemic. The chapter on navigating the online universe of information about science is frightening yet important reading. There are key discussions of how predetermined factors such as biases and algorithms may influence what one finds during an internet search and how digital literacy involves not just being able to find information but also being able to evaluate the information found. The chapter on science education provides valuable points about teaching science in a way that is engaging, fosters an openness to science, develops deeper understanding of the way that science is conducted, and shows how science is useful in everyday life.

The second section moves on to explore more deeply the psychological principles involved in how we come to terms with scientific information and the factors that influence acceptance, denial, or resistance. As a physician and a medical school faculty member in the middle of a global pandemic, I found this section more useful in trying to understand the roots of some of the controversy and the extreme reactions I have been seeing in the hospital and in the news.

Chapter 4, the first chapter in this section, explains cognitive biases and how even the most rational person has biases, ways of making decisions (fast reflexes vs. slower analysis and reflection), and how intuition, anecdotes, confirmation bias, and our own estimation (or misestimation) of what we already know can block impartial thinking about evidence.

The following chapter, "How Do Individuals Think about Knowledge and Knowing?," dives into epistemic cognition: how one recognizes and thinks about what knowledge is. The discussion of absolutism, multiplism, and evaluativism will be familiar to anyone who has ever stumbled into an argument about science over social media or at a family gathering. This is followed by a discussion of what people know about how science is done, the concept of uncertainty, and the role of trust in science

and scientific methods. Science and underrepresented populations, which is mentioned in the first chapter, is again mentioned very briefly here with examples illustrating how trust in science might be compromised.

Chapter 6 discusses how motivation and social identity can affect how one evaluates and takes a position on scientific findings. How information technology is influenced by, and in turn influences, these factors, particularly how we sort ourselves into groups online and the rise of "fake news." The point about communication strategies being more effective from someone "in" the group and trying to foster identification can be an effective strategy when thinking about communicating or addressing conflict regarding scientific issues.

The chapter about emotions and attitudes is probably one of the most challenging for scientists, as it goes beyond focusing on facts and evidence, exploring how feelings and emotions affect how one thinks. The example they use is the demotion of Pluto from full planet status—an issue that does not have a lot of effect on daily life, unless you are a planetary astronomer, but which generated much public attention. It is a good example of how an emotional response can affect what one thinks about the immutability of scientific findings and science in general. Another crucial discussion addresses how emotional responses to studying science in school or interacting with less-formal science education at institutions (museums, zoos, etc.) can make some science knowledge easier or more difficult to think about.

The book concludes with a summary of the main points and a list of action points identified as "Solutions: A Field Guide to Addressing Science Denial, Doubt, and Resistance." As with the end of the earlier chapters, these are divided into sections for individuals, educators, science communicators, and policy makers, with some expanded points and details.

Overall, the book is well written at a general level and is easy to follow. The examples illustrate rather basic dilemmas in science denial and doubt, and the discussions are not very formal and are often personalized (frequently using the authors' studies and anecdotes). Although the chapters in the second section do go deeper into the psychological theories and evidence for looking at how we think, or don't think, about science, the information is still at an introductory level. For more detail, each chapter is very thoroughly referenced and there are extensive citations for further background, exploration, and deeper detail.

Although the book is not a difficult read, I must admit that it took me some effort to pick it up and get through it. As a physician and an educator, I am used to discussing difficult questions about vaccinations, use of medications, clinical trials, as well as known unknowns and unknown unknowns, in medicine. During the pandemic, however, the amount and fervency of public, private, and professional controversy and discussion has been at times overwhelming. One point of the book is that as individuals each of us needs to examine how we look at science, how we think about what we know and what we don't know, and how we try to understand others who don't share our opinions or evaluation of evidence. I recognized a few of my own emotional responses and cognitive biases. While this book will not eliminate science denial, it does lay out some steps to having a positive impact, both on the individual and societal level.

With regard to spiritual or Christian doctrinal issues and how these have sometimes clashed with science, the authors present examples (i.e., evolution and a Christian university student) thoughtfully and without judgment, while still standing strong on the importance of science and understanding how these are not mutually exclusive and how the conflict can be addressed.

As I write this, I had been hoping that the pandemic would be over by now and that there would be less need for a book like this. After the pandemic, there will continue to be climate change and other important issues requiring scientific thought and attention. Having read the book through and thinking about where my own responses were coming from, I do feel more optimistic and better prepared to go out there and be an advocate, not an adversary, when trying to work through situations that involve science denial.

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TECHNOLOGY

THE ROBOT WILL SEE YOU NOW: Artificial Intelligence and the Christian Faith by John Wyatt and Stephen N. Williams, eds. London, UK: SPCK Publishing, 2021. 256 pages. Paperback; $31.99. ISBN: 9780281084357.

Writing about the impact of artificial intelligence on our understanding of what it means to be human, John Wyatt summarizes what I found to be the most helpful and interesting ideas in *The Robot Will See You Now*:

> Might it be possible that the twenty-first century provides a … range of profound challenges to orthodox understandings of human embodiment, personhood, relationships, morality and future hope? The ubiquity and effectiveness of various forms of machine intelligence have created a distorting lens through which our humanity is being perceived in new ways. … But perhaps this time in history represents a unique opportunity for creative thought and engagement as a Christian community, to deepen and enrich our understanding of what it means to be human, of the extraordinary possibilities of the tools we are creating and of the strange new world in which we find ourselves. (p. 72)

In each chapter a different writer offers their perspective on particular challenges posed by artificial intelligence (AI)—sometimes AI as implemented in existing technology, sometimes AI as imagined in literature, film, or futurist thinkers' predictions—to particular philosophical or theological claims consistent with Christian faith. (The writers are Christians; the book assumes a reader familiar with the vocabulary and sympathetic to the foundational beliefs of Christianity.) For example, Christina Bieber Lake draws on science fiction writers' ideas about the potential and significance of AI, suggesting that increasingly realistic simulation technology undermines our ability to discern what is real. She suggests this may lead us to question whether the distinction between simulation and reality is even meaningful, whether it matters if something is real or simulated.

Later in the book similar concerns are echoed by other writers as they consider robots of various kinds, designed to mimic human beings in various ways: as companions or caregivers, soldiers or sex partners. (Some readers may find Andrew Graystone's descriptions of "sextech" awkward reading, but his chapter also provides thoughtful reflection on the significance of sex in human relationships and the absence of such significance in a "relationship" between a person and a technological device.) A recurring theme is summarized by Vinoth Ramachandra:

> … by using a common vocabulary (for example, "information," "intelligence," "neural networks," "emotions") when discussing minds, brains and computers, we humanize the machines even as we mechanize humans. (p. 85)

As a computer scientist who is a Christian (and an educator of future computer scientists at a Christian university), I know that computer programming, and quantitative problem solving more generally, can be fun and meaningful. I am thankful to God for a job I enjoy and believe we can honor him by making and sharing good software—where "good" is not only defined by how the software is used but encompasses elegance and beauty in specification, design, and implementation as well. This perspective, or something like it, is mentioned several places in the book—most clearly by Crystal Downing and Noreen Hertzfeld in their discussion of human creativity, including technological making, as a reflection of our having been created in the image of a creative God. (Andrzej Turkanik writes about this as well, but his focus is on the creativity of composers and visual artists, not scientists or engineers.) Unfortunately, in several chapters there is a sense of "us and them," where "us" refers to Christians who are not involved in the development of new technologies, and "them" refers to those other people—or perhaps robots, in the not-too-distant future—who are.

The book includes an introductory chapter written by Peter Robinson, professor and researcher in the field of human-computer interaction, but this is written as an overview of vocabulary and current trends for readers less familiar with AI; computing professionals are mentioned but only to point out their responsibility to uphold appropriate ethical standards. I wonder whether a Christian engineer or software developer might be more receptive to a book like this if it included more concrete affirmation of the (very human) creative and cooperative work behind what is called artificial technology.

Recently I found myself in need of emergency medical care, frightened by symptoms different from anything I had experienced before. In a situation like this, one may feel vulnerable, helpless, and alone. After this (thankfully temporary!) illness, I reread John Wyatt's chapter on artificial intelligence applications in health and social care—the chapter most evocative of the book's clever title, *The Robot Will See You Now*. His writing about the deeper relational needs of a physically sick person—solidarity, compassion, understanding, empathy—struck me with a new and powerful urgency as I thought about my own recent experience. How would I have reacted to an invitation to pretend that a social robot could offer me these things? I am not sure. I knew I needed help;

perhaps I was ready to accept help from whatever source was available. But it makes me very thankful, when I try to imagine being helped by a robot, to have had the opportunity to interact with caring human beings whose compassion and understanding I can be confident was genuine.

Overall, I found *The Robot Will See You Now* to be a very thoughtful and well-written book, and I would recommend it to readers interested in reflecting on the interplay between artificial intelligence—both the technology and the philosophical or cultural ideas associated with that technology—and our ideas and assumptions about what it means to be human. The concern mentioned above, about how engineers or software developers might respond to the book, should not be interpreted as criticism. My hope is that Christian computing professionals would in fact be receptive to a book like this and would think carefully about the long-term impact of their work on how people understand themselves and their relationship to technology.

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RELIGION AND THE TECHNOLOGICAL FUTURE: An Introduction to Biohacking, Artificial Intelligence, and Transhumanism by Calvin Mercer and Tracy J. Trothen. Cham, Switzerland: Palgrave Macmillan, 2021. 266 pages. Paperback; $43.93. ISBN: 9783030623586.

Christians understand the world in terms of history. They look back to the creation and the Fall, are encouraged by the unfolding story of God's plan to redeem his people, and they look forward to the Second Coming, the resurrection of the dead, and the eschaton. But Calvin Mercer and Tracy J. Trothen claim: "The religions of the world will come to an end, or thrive, depending on how they respond" to the challenges of emerging human enhancement technologies (p. 3). Really? An existential threat to Christianity? Is such a threat possible? And if the Holy Spirit is working through today's church, how could "human enhancement technologies" affect its thriving?

To begin, it is necessary to note the first word of the book's title: religion. Mercer and Trothen are professors of religious studies at secular schools, East Carolina University and Queen's University, respectively. In such programs, religions are often reduced to social and cultural phenomena. They are important in human history, culture, international affairs, and other fields, but their internal details, such as their central god(s), are of secondary importance. Serious Bible-believing Christians *are* interested in how the church and the gospel are received in the world, but the authors' *exclusive* focus on externals may be unsettling. So, what are Mercer and Trothen up to?

Like others, Mercer and Trothen call attention to how futuristic technologies challenge conventional beliefs, including central elements of Christian theology, such as the doctrine of human beings made in the image and likeness of God, the *imago Dei*. Indeed, through Part I, chapters 1–4, they project how future technology will interact with—and threaten—two broad categories of religious faith: monotheistic and karmic. Chapter 3 explores basic concepts of these faith categories and the technological enhancements they will encounter.

In Part II, chapters 5–7, the authors survey the potential for techno-religious conflicts and synergies. And in Part III, chapters 8–10, they introduce "radical" enhancements: cryonics, mind uploading, and artificial superintelligence. Finally, in Part IV, chapter 11, Mercer and Trothen reiterate their main points, with special emphasis on their claim that "the future of religion and the welfare of society in general depends in part on how religions address radical human enhancement in the coming years" (p. 226).

Religion and the Technological Future was written as a textbook. All eleven chapters end with "Questions for Discussion," most requiring students to judge whether some development would be good or bad. No doubt, such exercises would test students' ethical reasoning, so the book may serve the pedagogical work of Mercer and Trothen. However, its shortcomings make it unsuitable for other audiences.

Readers with serious religious commitments will doubt the need to adjust their beliefs to accommodate technological change. Mercer and Trothen are aware of this fact; they frequently note that religious conservatives are less open to change. But history shows that change does occur, sometimes driven by conservatives willing to sacrifice stability in order to preserve what they value more. Indeed, with sufficient reasons, today's religious conservative could be tomorrow's revolutionary. Such a shift could occur within one religious worldview, its internals shaping how believers view external affairs and act to produce change.

Mercer and Trothen understand that religious reasoning is important, but they offer no direct doctrinal evidence why technology is a substantial threat to

beliefs, let alone an existential one. Chapter 3 (titled "Transhumanism, the Posthuman, and the Religions: Exploring Basic Concepts") is only 24 pages long; five pages offer definitions of transhumanism and posthumanism, and the last page lists discussion questions. So, the authors attempt to characterize the world's major monotheistic and karmic religions *in only 18 pages*. In-depth doctrinal arguments are needed, but they offer only thin and disappointing caricatures of belief systems that are held dear by most of the human race. Religion scholars may find this interesting, even compelling, but it will leave true believers cold.

Leaving undone the hard work of defining criteria by which the faithful in one tradition or another would judge technological enhancements, Mercer and Trothen speculate about the future using an ill-conceived conservative-to-liberal continuum. Where depth is needed, tautologies take center stage. In effect, they make the simplistic argument that some people will resist enhancement technologies because unspecified religious or political convictions make them resistant.

Religion and the Technological Future offers an intriguing view of the future, but it assumes that technoscientific progress will come with an oppressive loss of control. Yes, heartfelt faith traditions will, in one way or another, be changed by emerging technologies, but is it inevitable that believers will face an existential crisis? And if emergent technologies actually threaten what people truly value, will they not be rejected?

Consider nuclear weapons. After Hiroshima and Nagasaki, the accelerating arms race cast a dark shadow over civilization. Books and movies such as *Fail-Safe* and *On the Beach* left little room for hope. Then, in 1964, *Dr. Strangelove* flipped the narrative, presenting "The Bomb" as a ridiculous farce. People and societies adapted to the existence of nuclear weapons and moved on with life. Will they not also adapt to whatever the technological future brings?

In this century, advanced robots, computer systems, and who-knows-what will certainly emerge, but God is everlasting, and he promises that believers will have everlasting life. So, let his will be done, *on Earth as it is in heaven*, notwithstanding whatever dark shadows of change may come.

Reviewed by David C. Winyard Sr., Department of Engineering, Grace College and Seminary, Winona Lake, IN 46590. ◀

Letters

Agriculture: An Industrial Paradigm or an Ecological Paradigm

I read with interest Terry Gray's "Pronuclear Environmentalists: An Introduction to Ecomodernism" (*PSCF* 73, no. 4 [2021]: 195–201) and found the article very informative. Gray advocates for increased intensification of agriculture, arguing that this will free up other land for wild nature. However, the impacts of such intensification will not and cannot remain localized.

I grew up in Iowa, where the native tall grass prairie ecosystem was replaced by one of the most intensively industrial agricultural regions on the planet. Grassland flora and fauna are now among the most at risk on the continent. The deep prairie loam soils have been greatly reduced in depth and become compacted by heavy machinery. Fertility is largely maintained by inputs of fossil-fuel based synthetic fertilizers. Flooding impacts have intensified due to the loss of most of Iowa's grasslands and wetlands. Water quality due to agricultural use is a major issue in Iowa and throughout the Mississippi River watershed.

Hope lies in the application of techniques (such as in-field prairie strips and wetland restoration) to soften these impacts. But more fundamentally, agriculture needs to move from an industrial paradigm that treats land as just an economic asset to an ecological paradigm which recognizes the land as a gift from the Creator and treated accordingly.

Lynn Braband
ASA member

Called to a God-Centered Garden or City?

Thank you to Lynn Braband for his response to my article (Terry Gray, "Pronuclear Environmentalists: An Introduction to Ecomodernism," PSCF 73, no. 4 [2021]: 195–201). Admittedly, he was responding only to a near peripheral comment, but one that in some ways engages the heart of the article. I sense a "back to the Garden" spirit in his comments and especially in the last sentence. I will not deny the several problems with industrial agriculture that he points to, but the solutions to these are not to return to a de-industrialized agriculture. The productivity of modern agriculture is a necessary development and is fully consistent with a Christian stewardship view of creation which is not a mere preservation of God-created and wild nature. It includes development