ENVIRONMENT

THE NATURE OF BEING HUMAN: From Environmentalism to Consciousness by Harold Fromm. Baltimore, MD: The Johns Hopkins University Press, 2009. 288 pages. Hardcover; $35.00. ISBN: 9780801891298.

Harold Fromm is a literary critic and one of the founders of the ecocriticism school of thought within the Modern Language Association. This book is a collection of his essays that trace the evolution of Fromm's thought concerning the meaning of being human and fully part of the natural world. He draws on everything from evolutionary biology to neuroscience and consciousness studies, to explore the issue of free will as opposed to genetic determinism, spirit as opposed to pure matter, and mind versus body.

Fromm rejects any notion of the social construction of nature and social constructivism, clearly moving toward a fully materialistic view of reality. As he states in his introduction, the essays will describe "ways in which evolution, ecology, the 'environment,' physical matter, the brain, the self, the mind, and culture gradually merge into one protean substance of variable expressibility" (p. 9). Sadly, his bias that religious belief is primitive and naive, a mythology with utilitarian uses that allow us to avoid harsh reality, pervades the book. This limits his ability to draw on rich theological traditions that have struggled with the central issues he addresses.

The early essays in this book are the weakest, and they describe Fromm's discovery of "the environmental" through his encounter with air pollution. They tend to be narcissistic, and rarely show any understanding of the social structures that shape human decisions. For example, he makes no connection between air pollution and his long commute by car to Chicago.

The book becomes more interesting in the following chapters, which comprise overviews of debates among public intellectuals, debates related to humans and nature. Each chapter engages a few key pieces of literature. For example, in one key chapter Fromm addresses Foreman's *Confessions of an Eco-Warrior* and Bookchin's *Remaking Society*, books that represent two streams of early ecological thought—Deep Ecology and social ecology.

Other chapters range from discussions of Leopold's *Sand County Almanac* to the topic of policy and health discussed in three books—*Bodies in Protest* by Kroll-Smith and Floyd, *Thinking Ecologically* by Chertow and Esty, and *Primitives in the Wilderness* by van Wyck—to the issue of animals in the works of Coetzee's *The Lives of Animals*, Peter Singer's *Animal Liberation*, and the work of Elizabeth Costello on animal rights.

Part Two of this book takes on the broad category of "Nature" and Evolution. Essays address the intellectual processes that lie behind the procedures of the sciences, drawing on the works of Levitt and Gross, Sandra Harding, Donna Haraway. The discussion concerns the theme of the nature of rationally situated knowledge, and the social construction of scientific practice. Fromm rejects the notion that science is just one story among many, and claims that many authors blur the distinction between the fruits of science, the politics of science, and the nature of scientific rationality. The essay that engages the debate between E. O. Wilson's *Consilience* and Wendell Berry's *Life is a Miracle,* clearly shows Fromm's commitment to "objective" science. He embraces sociobiology, and is critical of Berry's perspective and belief that not all can be known.

The issue of nature versus nurture is viewed through the works of Steven Pinker. The progression shows Fromm's increasing commitment to Pinker's position that there is no conductor of the orchestra, but just billions of neurons forming systems that feel like a self. Fromm goes on to try to link the assumption about what it means to be human, to the arts and esthetic evaluations. He draws on the works of Dissanayake, with a Darwinian twist, to suggest that art-inclined individuals survived better than those that did not.

Fromm's thought becomes yet more committed in this direction as he writes of the exhausted fictions of both human-environment separation and the fiction of there being a "soul." His consistent equating of a human-environment dualism with religious belief, all of which is fiction, keeps him stuck in a track. From Emerson to Dawkins, Fromm resonates with works that dismiss the "cheap simplistic supernaturalism that explains nothing beyond human fantasies and desires" (p. 229).

Section Three of Fromm's essays moves on to the challenge of consciousness, arising out of the cognitive sciences and neuroscience. Dealing with the works of Calvin, Pinker, and Barash, he fuses psychology, physiology, biology, and neuroscience with insights from the humanities. His goal is to use this body of work to force his audience to accept "spook-free" explanations of consciousness. Causation is a closed material system with no intervention by "spooks." There is nothing external to our physical selves. Fromm sounds increasingly shrill in his rejection of any self that is other than one constructed by involuntary neurons with vast prehistory that are reformulated by culture. Humans become more and more constrained in their ability to make choices, as Fromm's reflections progress.

Fromm's concluding essay is, "My Life as a Robot," bringing us to the inevitable endpoint of this journey of thought. He demands that we restrict any fantasies we might have about human freedom. Darwinian evolution and behavioral ecology have put to rest any illusions of human autonomy. Yet he struggles with his conclusion. He is caught in socio-biology's problem of not being falsifiable. He admits to skepticism of his skepticism. But he cannot see a way out, and concludes that any so-called spiritual life remains a "self-regarding hoax" (p. 274). We are, in fact, robots who do not have the ability to choose or to will. In reaching this conclusion, he is confronted with reality—how can there be a system of morality, law, and punishment if people are not responsible for what they choose to do? The shallowness of his answer unmasks his unwillingness to wrestle with some of the best theological philosophical thinkers who have faced the question of evil and suffering in the world. Fromm simply concludes that we must punish those who are "bad," such as murderers and terrorists, because to do otherwise would bring about an end to civilized life.

However, to pretend that those who are punished have chosen to misbehave, is a form of cruelty and denial. Ultimately, he has led us in mental circles.

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DOMINION OVER WILDLIFE? An Environmental Theology of Human-Wildlife Relations by Stephen M. Vantassel. Eugene, OR: Resource Publications, 2009. 208 pages. Paperback; $26.00. ISBN: 9781606083437.

Instead of proffering a theology of human/wildlife relations as the title suggests, this book is primarily an *apologia* for Christians who hunt, trap, and work with animals. The principal aim of the book is to fend off interference, whether intellectual or vocational, from Christian writers who object to the ways in which humans have traditionally dealt with animals.

Stephen Vantassel's preferred term for such persons is "Christian animal rights activist" or collectively, "the CAR Movement," which perhaps claims too much for the smattering of writers who address such issues. While the Christian intellectual community has responded to broad environmental concerns with numerous books and articles in a field identified as "eco-theology," the field of Christian animal rights has not attained even nominal status as a cottage industry.

Vantassel's contribution is a welcome and important one. As project coordinator for wildlife damage management at the University of Nebraska, he brings the realities of human/wildlife interactions to a discussion that frequently lacks grounding in the real world. One criticism of writers such as Andrew Linzey and Stephen Webb is that they manifest a naiveté regarding ecological and biological realities. Unfortunately, Vantassel seldom delves into real-world examples, and the reader does not encounter a case study until the last third of the book.

Vantassel recognizes that the traditional Christian position (referred to as Dominionism) has been buffeted by serious criticism. He sees little theological or biblical reason, however, to abandon an anthropocentric orientation in which creation exists to serve humans. Humans are ontologically superior, being made in the image of God (the gist of which is left undefined). God intended humans to use the creation, including its creatures, to meet human needs. Vantassel's theological position is in line with the conservative Wise Use movement; the evangelical writer cited most approvingly is Calvin Beisner.

Vantassel suggests that the term Dominionism be abandoned for his own neologism "Shepherdism." As Vantassel states, "Shepherdism is fundamentally related with Dominionism except that Shepherdism avoids the negative stereotypes held against Dominionism, while upholding God's decree that humans maintain their superintendence over animals." The only claims that animals legitimately impose on us are the obligation to preserve kinds (protecting endangered species) and to minimize suffering if feasible under current techniques and technology. Even this latter duty is mild. As Vantassel states, "… in light of Christ's oversight of the treatment of harvested fish and drowning pigs, it is reasonable to conclude that humans may inflict and/or ignore a fair amount of animal suffering."

While Vantassel voices vague appreciation for the intentions of those within the CAR movement, he is more concerned with deflecting their bolder and more intrusive claims, such as vegetarianism and non-exploitation. His deflection strategy follows two courses: (1) caricaturing their theology; and (2) assessing and countering their biblical and ethical strategies. With a broad brush, Vantassel paints CAR activists as hermeneutically modernist, neoorthodox, and liberal, as well as guilty by association with feminist theologians. Readers interested in an assessment of Christian animal rights theology that is both sympathetic and critical will find the treatment almost entirely slanted toward the latter.

The deeper problem with Vantassel's treatment is that he misses nuances of argument that are truly valuable. To give just one example, Anglican theologian Andrew Linzey quite willingly espouses human uniqueness and superiority. What is innovative about Linzey is the telling twist he makes in the Aristotelian-Thomistic logic, that lesser things exist to serve the greater. For Linzey, Christ taught that the greater serves the lesser, such that human greatness is defined by our role to serve the rest of the creation. This is a valuable insight, even if one stops short of Linzey's vegetarianism and insistence on non-exploitation.

Ultimately, Vantassel's work needs further refinement. He would be helped immensely by wrestling with Christian thinkers such as Holmes Rolston, who expouse theocentrism and who understand that this world may be anthropo-apical (i.e., humans have the highest value of any organism in the biotic community), but nevertheless that there are legitimate limits on what may be done to God's creatures, and the uses to which they may be put.

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HISTORY OF SCIENCE

THE AGE OF ENTANGLEMENT: When Quantum Physics Was Reborn by Louisa Gilder. New York: Knopf, 2008. 443 pages, illustrations by author, index. Hardcover; $27.50. ISBN: 9781400044177.

Quantum physics, despite having been with us now for over a century, continues to mystify and challenge physicists, philosophers, and the general public alike. Gilder's first book offers an accessible and creative unpacking of the origin, development, and reception of some of its central features, while providing intriguing glimpses into the often quirky lives and interactions of many of its developers, emphasizing the thread of "entanglement" throughout. Her explicit treatment of the intrinsic human cultural character of science can help in rejecting positivistic and objectivistic views.

The Age of Entanglement opens with an amusing account of Bertlmann's astonished encounter with the 1981 paper, "Bertlmann's Socks and the Nature of Reality,"

in which John Bell ties together the reliably unmatched footwear of his eccentric colleague with the enigmatic connections found in the quantum world. This narrative also serves to introduce a complementary theme of the book, the curiously entangled lives of quantum physicists throughout the entire twentieth century. From the outset, one encounters Gilder's methodology, as she imaginatively weaves together a believable narrative of dialogue, encounter, and circumstance, taking as her sources existing historical texts, such as letters, memoirs, conference records, journal articles, and biographies, supplemented by her own correspondence with practitioners. Instead of the usual quotes and citations, Gilder's seamless narrative is supported by an extensive 58-page documentation of the origins of words, sentences, or ideas used from these records. No quantum physics knowledge is assumed, and footnotes and a glossary should help reach a broad audience. Fortunately, vague or circular definitions are rare, but saying "electrons [are] electricity-carrying subatomic particles that are a crucial component of all matter" (p. 6) does little to gain the reader's confidence. She does offer welcome help on obscure pronunciations: E. T. H. (p. 32), Blegdamsvij (p. 53), Helgoland (p. 74), Zajonc (p. 309).

Gilder's main thesis is that the recent resurgence of interest in the interpretation of quantum mechanics afforded by new experiments demonstrating entanglement (what Einstein disparaged as "spooky action at a distance"), remains intimately connected to the most basic questions faced by its founders. She therefore follows the entanglement thread through its illustrative history, from long before Schrödinger's 1935 coining of the term, right up to the present. Entanglement is the way in which the parts of a system (e.g., two photons) retain a uniquely quantum-mechanical linkage despite complete isolation from one another, such that the type of measurement performed upon one part is correlated with the results of a measurement done upon the other, even when these are too remote to allow for causal influences. This feature of quantum physics was used by Einstein and others in 1935 to claim it must be incomplete (the famous "EPR paper"). Bell, in 1964, derived an inequality whose violation would entail that either a classical realism of local hidden variables, or the principle of causality, must be false. And in 1981, Alain Aspect's experiment showed precisely that violation, leading most physicists to retain causality and adopt the entangled quantum picture in place of classical realism.

Gilder discusses how quantum physics, unlike classical physics, cries out for interpretation. Sommerfeld is quoted as saying to Einstein, "You know I can only contribute to the technology of quantum theory—you have to create its philosophy" (p. 55), as part of an imaginatively recreated conversation between these two and Bohr as they travel absent-mindedly on a Copenhagen streetcar. Bohr, opposed to reductionism, correctly concludes as they return to their missed stop, "everything does not always boil down to calculations" (p. 58). Throughout the book, Gilder vividly depicts how physicists, the more they learn, truly and deeply grappling with the ideas and realities with which they are faced, are never content to settle for "saving the phenomena"; furthermore, many in the mainstream entertain metaphysical and even theological questions. Gilder details the intricate work of experimental physics as well as how, in gatherings of physicists, the scheduled talks are far outweighed in value by the unplanned conversations.

The essentiality of unique personal interactions can be seen throughout the history of the subject. Joviality, camaraderie, teachability, drive, deference, trust, competition, adventure as well as longing, jealousy, loneliness, suspicion, desperation, racism, stubbornness, and war all feature to varying degrees; even adultery, murder/suicide, abortion, and kidnapping appear. Gilder's detailed narrative is chock full of anecdotes which can at first appear marginal, but are later revealed to be entangled with the tapestry. Her prose often waxes poetic, with delightfully creative turns of phrase, metaphors, or alliteration: "… in a manner palely reminiscent of [Jauch's] old teacher Pauli" (p. 245) and "web of experimentalists who wanted to work with entanglement …" (p. 275).

A few physics errors reveal the author's nonphysics background, but these do not detract from the story and likely annoy only physicists. (Two examples: she refers to Planck's solution of "the ultraviolet catastrophe" for "light in a box" [pp. 26f.] while the essential point of a black box and the simple nature of the catastrophe are entirely missed; and she says, "an electron … changes its speed [by] turning" (p. 33), whereas "speed" should be "velocity.") I have begun a collection of errata at www.csc.twu.ca/sikkema/gilder in hopes that a future edition can be cured of these blemishes. A glaring omission is the entire concept of decoherence, which has, for almost the past two decades, also played a central role in the classical/quantum interface (e.g., wavefunction collapse).

I highly recommend the book to anyone seeking a novel account (pun intended) of many of the questions of quantum physics.

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MATHEMATICS

NAMING INFINITY: A True Story of Religious Mysticism and Mathematical Creativity by Loren Graham and Jean-Michel Kantor. Cambridge, MA: Harvard University Press, Belnap Press, 2009. 227 pages, notes. Hardcover; $25.95. ISBN: 9780674032934.

Loren Graham is a specialist in the history of Russian science who has written many books and articles on the subject. One such book, *Science and Philosophy in the Soviet Union,* was a finalist for a National Book Award. One of his most recent books is *Russian Religious Mystics and French Rationalists; 1900–1930.* Jean-Michel Kantor is a French mathematician whose main interest is topology, and he is a popular writer on science. His website details his interest in the *diffusion* of science. (I will use G-K for the book's authors.)

As students of mathematics we invariably confront infinite sets. We learn about the natural numbers 1, 2, 3, 4, …, but, early on, we form the infinite *set,* {1, 2, 3, 4, …} where we complete the formation of natural numbers *in*

our minds and append the ellipsis with the symbol } to form the set, *N*, of all natural numbers. Continuing this process, we study and name the following infinite sets: the set *Z* of integers, the set *Q* of rational numbers, and in an explosive burst—to include the set *A* of all algebraic numbers, and the set of all transcendental numbers, *T,* finally arriving at the set of real numbers, *R,* so familiar to scientists today.

In a similar way, we form the set of all US states, and we say that the cardinal number of this set is 50. But since mathematics is the science of the infinite, we dare to take the position that *every* set should have a cardinal number and that sets have the same cardinal number if, and only if, they can be put into one-to-one correspondence.

In 1873, the German mathematician Georg Cantor published a paper in the *Crelle Journal* which proved that the set *R* of the *continuum* of real numbers is nondenumerable; that is, there is no one-to-one correspondence from the set *N* to the set *R*. Furthermore, he proved that there is a one-to-one correspondence between *R* and the set of all subsets of *N*. Cantor named the cardinality of the natural numbers N_0 and the cardinality of *R* by the German letter *c* and later also by 2^{N_0}.

Later, in his now famous speech given to the International Conference of Mathematicians at Paris in 1900, David Hilbert posed as his first problem (of 23) whether there are any nondenumerable sets whose cardinal numbers lie between N_0 and *c*. He proposed the name N_1, for the first such, the name N_2 for the second such, and so on. The Continuum Hypothesis is that $N_1 = c$.

As is obvious from the following quotation, this book breaks some new ground in the way that this history of mathematics is written.

> This book is devoted to a little known but exemplary episode in the recent history of the relationship of mathematics and religion, all within the context of much larger issues of religious heresy, rational thought, politics, and science. It is intended for general readers, although we hope that mathematicians will also find it worthwhile. It is the story of an initial breakthrough by a German mathematician (Georg Cantor), that was picked up and developed further by the French, who eventually stalled, but who taught the new development to Russian mathematicians; the Russians then returned to their homeland to push onward to a fundamental insight.
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> At the center of the story is an encounter at the beginning of the twentieth century between mathematicians on set theory and the religious practices of the heretical Name Worshippers in Russia. Set Theory was, at first, developed in France but then underwent a profound crisis, only to have the Russians enter the scene with new energy. We will describe how two different states of mind connected with two different cultural contexts led to contrasting results; French skepticism and hesitation, Russian creativity and advancement. A central idea of this book is that religious heresy was instrumental in helping the birth of a new field of modern mathematics.

I suggest that the book is *multidimensional* in its treatment of the various topics it considers. I shall discuss a few of its dimensions.

- **A Comprehensive Look at the Personalities.** There are deep and detailed biographies of some of the mathematicians featured, which include their family history, their education, their personalities, their mathematical work, their foibles (including sexual preferences and practices), their illnesses, their psychological struggles, and the untimely deaths of some of them.
- **The Set-Like Structure of the Book.** The first set of importance is a singleton consisting of the German Georg Cantor, the second set is a singleton consisting of the German David Hilbert. The third set is a trio consisting of the French mathematicians René Baire, Emile Borel, and Henri Lebesgue, while the fourth set is a trio of Russian mathematicians consisting of Pavel Florensky, Fedor Egorov, and Nicholi Luzin. There is another set of 661 monks who stated that they did not support the doctrine of "Name Worship," and another set of 517 monks living in the same monastery who supported the doctrine and also declared that they would remain there till death.
- **Pictures and Illustrations.** The book features a gallery of some thirty-six illustrations which are scattered in the commentary. Yes, the gallery includes formal pictures of the mathematicians who played important roles in the story, including an unflattering picture of the villain in it. But there are several other photographs which will be of interest to the reader. One is a photograph of the St. Panteleimon monastery on Mount Athos in Greece; another, the buildings of the Moscow State University where the mathematics seminars were held. There is a picture of Egorov's gravestone in Kazan, the city where he was exiled, and also a sketch of the genealogical chart of the Moscow School of Mathematics.

  For first-time readers, it may be helpful to view this gallery of photographs as one begins to read the book. Each photograph plays an important role in this gripping story. I found that I returned to the gallery again and again, since it contributed much in making the story come alive.
- **Worship and Prayer.** An important entity which plays a pivotal role in this history is the famous Jesus prayer, *Lord Jesus Christ, Son of God, have mercy on me, a sinner*. As practiced in the Eastern Orthodox tradition, it is intended as a way to obtain quietness and peace, by physical and mental fusion with God, by combining hundreds of repetitions of short sequences of the same words. There are three stages of immersion in praying this prayer. First, the words are intensely heard by the worshiper. Then the prayer enters the mind of the believer, making the mind cling to the words so that the worshipers find themselves in the presence of God. Finally, the prayer goes to the heart of the worshiper, giving illumination, with the result that the person achieves a oneness with God.
- **Heresy and Controversy.** Now comes the controversial part. Does the name *Jesus Son of God* become identified with God through this fervent worship? The Eastern Orthodox Church has always said "No!" to this question and has declared that this view of the Name Worshipers is heretical. The Name Worshipers, including theologian-mathematician Pavel Florensky and mathematician Dmitri Egorov, believed "Yes."
- **Historical Contrast.** The authors add the most important dimension to the story by describing a historical event:

the French trio in their choices and practice of mathematical work proceeded in another direction from that of the Russian trio. The result was that the French did not continue to contribute to the deciding of the Continuum Hypothesis, whereas the Russians became enthusiastic participants in such research.

- **Philosophical Explanation.** Now comes the interesting part of the book. The reason given by G-K that the French trio changed the direction of their research is that they began to see that the problem posed by Hilbert was very hard and required new techniques in defining uncountable subsets of reals numbers. True, they had decided to use the context of Axiomatic Set Theory, ZF, as developed by Zermelo and Fraenkel for their work. After becoming aware of the hidden assumptions they had made in their arguments, and on hearing about some of the possible paradoxes in Axiomatic Set Theory, they lost their verve and nerve for the problem, and expressed such publicly. Graham and Kantor attribute the Frenchmen's judgment to their *rationalism* as developed by René Descartes, and also to the philosophy of Auguste Comte known as *positivism*. Thereafter, they discontinued their work on the problem.

  The Russian trio consisted of two Name Worshipers, Florensky and Egorov, and a third member, Luzin, who had often traveled to France and was aware of the work of France's prominent mathematicians. G-K document the fact that Luzin was at a low point in his life. He had lost his zest for mathematical research. Notwithstanding, he read the theology of Florensky as found in his now famous work, *The Pillar and Ground of the Truth,* and in the manuscript for *Holy Renaming*. Along with this, his letters show that he read Plotinus and William James. The result was that he became a Name Worshiper! Because of his conversion, he discerned the value of *naming* certain uncountable subsets of real numbers, and of proving theorems about them. By doing so, he created the area of mathematical research called Descriptive Set Theory. G-K summarize their historical findings in the following quotation.

  > The Russians who developed descriptive set theory and assigned names to subsets of the continuum posed the possibilities of the existence of new entities in the mathematical universe, and they went on to provide a program for future research which resulted in substantial agreement of mathematicians all over the world about the new entities. That achievement might have occurred without the inspiration of a religious heresy, but as researchers loyal to the historical record, we maintain that the way it actually happened was within a context of mystical, Name Worshiping stimulation. (P. 192)

This book will take mathematicians and interested scientists on a fast-paced, intriguing, challenging but enjoyable journey. Graham and Kantor have indeed told a true mathematical story with a well-documented interpretation, a Russian view of the infinite in mathematics. I predict that readers of this book from the ASA community will find it a terrific read. Furthermore, I believe that some scholars in this Christian community might want to discuss, analyze, criticize, or amplify the argument of this well-written book. Theologians who read the theological essays of Florensky will better understand some fundamental doctrines and practices of the Eastern Orthodox Church of the early twentieth century, doctrines which will benefit us today.

I will give Pavel Florensky the final word. What follows is a quotation from his book, *The Pillar and Ground of the Truth*. Maybe this theological statement is what the Russian mathematician Nicholi Luzin needed to read!

> Neither "the contradictions of the Holy Scriptures and the dogmas" nor "spiritual illuminations" contain anything absurd and therefore if both an honest rationalist and an honest mystic refer to them they do in fact exist. But that which is a contradiction, and an unquestioned contradiction, for the *ratio*, stops being a contradiction at the highest level, is not perceived as a contradiction, is synthesized. And then, in a state of spiritual illumination; there are no contradictions. Therefore, there is no need to try to convince a rationalist that there are no contradictions: they exist, they are unquestionable. But a rationalist must believe a mystic when the latter states that the contradictions turn out to be a higher unity in the light of the Sun that does not set, and then they precisely show that the Holy Scriptures and the dogmas are higher than fleshly rationality, and thus could not be thought up by man; i.e., are Divine. (P. 358)

Reviewed by Paul J. Zwier, Professor of Mathematics, Emeritus, Calvin College, Grand Rapids, MI 49546.

Origins & Cosmology

CREATION OR EVOLUTION: Do We Have to Choose? by Denis Alexander. Oxford: Monarch Books, 2008. 382 pages, notes, index. Paperback; $18.99. ISBN: 9780825462924.

Denis Alexander is well known to the ASA, as editor of *Science and Christian Belief* and director of the Faraday Institute for Science and Religion. He has led a distinguished career as a research biologist, including leadership of the Molecular Immunology Programme at the Babraham Institute in Cambridge. In *Creation or Evolution,* he offers a clear and compelling case for theistic evolution, the view that God used evolution to bring about all the species on Earth, including humans. This is one of several recent books on evolution for evangelical audiences, four of which were reviewed by Bethany Sollereder in the March 2009 issue of *PSCF*.

Alexander begins by discussing principles of biblical interpretation and the doctrine of creation. This is an excellent approach for his predominantly evangelical audience since it addresses faith concerns first, rather than diving straight into the scientific evidence. These chapters are full of biblical references, including examples of biblical characters who interpreted God's word literally and were mistaken (consider David's response to Nathan's rebuke, or Nicodemus's response to Jesus).

Chapters 3–5 provide an excellent summary of scientific evidence for evolution, at a level accessible, although challenging for readers who have not had college science. He briefly reviews the evidence for great age, but quickly

moves on to fascinating details of fossils, genes and development, the many types of mutation (from point mutations to chromosome fusions), and the interplay of environmental pressures and adaptation. He includes a variety of excellent examples, from retroviral insertions to "ring species," which allow scientists to study speciation processes as they are happening. Anyone but an expert will learn some fascinating science from the examples Alexander provides.

In chapter 6, Alexander responds to some common objections to evolution, both scientific and theological. In chapter 7, he returns to biblical interpretation, this time focusing on Genesis 1 and its meaning for us in light of Ancient Near Eastern cosmology. Chapter 8 is an interesting historical review of the church's response to evolution, including Warfield, Orr, and Wright who wrote positively of evolution in *The Fundamentals*, while critiquing the unfortunate atheistic and other baggage it has acquired.

Chapters 9–13 tackle human origins—the biblical account of Adam and Eve, the fossil and archeological evidence for hominids, the genetic evidence for common ancestors with apes, and the theological issues of death before the Fall, pain and suffering, and original sin. He centers the discussion on five interpretative models of Adam and Eve, ranging from an ahistorical parable meant to teach eternal truths, to the miraculous creation of two ancestors of humanity 10,000 years ago. This is a useful device for giving readers a range of options, although some of the options receive little attention in favor of his working hypothesis: that the human race began about 200,000 years ago, but Adam and Eve were a pair of Ancient Near East farmers living about 10,000 years ago.

When discussing the difficult faith issues, Alexander digs into the Bible, reviewing many relevant passages. At times, it would have helped to hear more about the *theological* positions Christians have historically held on issues such as the transmission of original sin and the soul. His discussion of pain and suffering is compassionate and pastoral.

Chapters 14 and 15 are a response to intelligent design (ID), critiquing both the scientific and philosophical arguments. Supporters of ID probably will not feel that Alexander has addressed some of their best recent arguments; however, it is clear that Alexander has read several ID books and articles and is replying thoughtfully to the arguments presented there. The final chapter, 16, tackles the wide-open research area of how life first arose on the early Earth. While acknowledging that the gaps in our scientific knowledge are far greater than what we know, Alexander has no theological trouble with origin of life research. He writes, "In none of this account have we been talking about 'blind natural forces.' … These are God's chemicals and God's molecules that we are talking about."

Alexander's stated goal is to promote dialogue, to help Christians learn to disagree in a loving way without adding to the Gospel. We highly recommend it for consideration by Christians who are open to an old earth but are unsure about evolution, and as an excellent resource (especially with its extensive endnotes and useful index) for Christians who accept evolution as the means God used.

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Philosophy & Theology

CREATING SCIENTIFIC CONCEPTS by Nancy J. Nersessian. Cambridge, MA: The MIT Press, 2008. 272 pages. Hardcover; $32.00. ISBN: 9780262141055.

Perhaps it has almost become a truism that scientists access and understand the phenomena they study, through models. Nersessian's book adds to the growing literature on model-based reasoning and gives a plausible, explicit account of such reasoning.

In chapter 1, she lays out her basic approach, combining methods from both historical and cognitive science research. A key assumption of her approach to model-based reasoning is what she calls the continuum hypothesis: scientific reasoning developed out of ordinary cognitive capacities and reasoning. Many readers will be sympathetic to this continuum hypothesis, and recognize that it contrasts sharply with the old positivist picture of scientific reasoning, which tried unsuccessfully to find some special criteria demarcating scientific reasoning from ordinary reasoning that we apply in everyday life situations.

What is characteristic of scientific reasoning, in Nersessian's view, is that scientists employ specialized knowledge, which the nonscientist generally does not possess, to carry out mental simulations—manipulations of mental models, such as running the workings of a proposed device in the imagination over and over again, varying the parameters. But even this sophisticated form of simulation is a refined or augmented version of a basic cognitive capacity that we use in everyday life.

Nersessian marshals much evidence in favor of her core thesis, that scientists use the ability to imagine and manipulate mental models in their research. Chapters 2 and 3 describe two case studies (Maxwell's papers on electrodynamics and an explicit reasoning experiment on a spring oscillation problem, respectively), while she discusses the cognitive science literature on the subject in chapter 4. Perhaps the most important conclusion that she draws from this evidence is that scientific reasoning and inference draw more on model manipulation than on the manipulation of propositions following fixed rules (e.g., deductive or inductive logic). Although this conclusion runs against the grain of a core assumption of much analytic philosophy—that mental contents and manipulations are primarily matters of operations on propositions or proposition-like statements—her case seems quite persuasive, that mental models not reducible to propositions are a key feature of the scientist's reasoning toolkit. I find this emphasis on exploring nonpropositional forms of knowledge in scientific reasoning helpful, because not everything we think, do, or say is either propositional or the result of manipulating propositions.

The core of Nersessian's view of model-based reasoning is presented in chapters 4 and 5, while chapter 6

applies the model to the formation and revision of scientific concepts. The key idea in the latter is that the scientist's manipulation of models—while paying attention to the various constraints implied by the models, as well as the affordances or windows to understanding the models give—is the basis for creativity in exploring new concepts and producing conceptual change. Readers interested in these questions will find it instructive to compare her view on conceptual change with that of Kuhn. Both give insightful discussions of how scientists can ground their conceptual shifts in reason without being beholden to the more wooden picture of rationality characteristic of positivist philosophy of science.

Depending on background, some readers might be nervous that Nersessian sometimes adopts typical cognitive science and neural science language that has reductionistic overtones. However, I think one can profitably read her book as expressing the more circumscribed idea that some cognitive centers of the brain are involved in scientific reasoning, without committing oneself to any reductionist thesis. Other readers may worry that the representational epistemology that Nersessian uncritically adopts may introduce distortions into her account of model-based reasoning (e.g., those who have read Charles Taylor's mammoth *A Secular Age*). Here, it is helpful to keep in mind that she explicitly restricts her view of model-based reasoning to the construction and manipulation of models in scientific contexts, in which a representational epistemology perhaps finds its highest degree of plausibility and appears least problematic. However, her view does not automatically imply that all human cognitive function—particularly our everyday copings—is representational. Indeed, it is helpful to have a cognitive scientist arguing strongly in favor of a thesis that model-based scientific reasoning is not "all in the head," but draws substantially on those affordances and constraints that the environment of the laboratory—telescopes, computers, and even our bare hands—give us (so-called extended cognition).

On the whole, Nersessian presents a balanced, thoughtful treatment of model-based reasoning, concept formation, and change that is focused on her narrow (but important!) target of scientific practice. The ultimate plausibility of her own model of this process will depend on the incoming evidence and interpretation of that evidence as is always the case in science.

Reviewed by Robert C. Bishop, John and Madeleine McIntyre Endowed Professor of History and Philosophy of Science, Physics Department, Wheaton College, Wheaton, IL 60187.

THE OPEN SECRET: A New Vision for Natural Theology by Alister E. McGrath. Oxford: Blackwell Publishing, 2008. 372 pages, including bibliography and index. Hardcover; $99.95. ISBN: 9781405126922.

William Alston defined natural theology as "the enterprise of providing support for religious beliefs by starting from premises that neither are nor presuppose any religious beliefs." Since the beginning of the Enlightenment, natural theology has primarily taken the form of efforts to prove God's existence by an appeal to the natural world. McGrath rejects the enterprise that Alston sets forth in his definition, and proposes a new approach that he hopes can revitalize natural theology. Although McGrath is uncomfortable with radical postmodernism, he offers what is essentially a postmodern perspective, arguing that nature is not self-interpreting, but that, if one starts from an interpretive framework based on Christian principles, nature can speak richly of God.

The Open Secret is organized into three parts. The first argues for the ubiquity of the human search for transcendence, and positions natural theology as a systematic way of undertaking such a search. In the second, McGrath attempts to lay a Christian foundation for his new approach, arguing for the ambiguity of nature, the sterility of the Enlightenment approach, and articulating a framework of Christian belief that can inform one's perspective on the natural world. The last part discusses what his approach to natural theology offers toward understanding how we are to think, feel, and act toward nature. He organizes his conclusions by means of the Platonic triad of truth, beauty, and goodness.

The second part is the strongest. McGrath makes a compelling case that nature is not self-interpreting and thus lends itself to many interpretations. Hence the Enlightenment approach is a dead-end; his exposition of its methodology and ultimate failure is clear and insightful. McGrath's formulation of a set of foundational Christian principles for interpreting nature is trinitarian and incarnational, and rightly insists that any Christian interpretation of nature be rooted in the person of Jesus Christ.

Part III provides the bottom line; this is where McGrath discusses the kind of fruit that might reasonably be expected from his new approach, by focusing on a few big-picture issues. The chapter on truth provides two examples, the anthropic principle and the so-called "unreasonable effectiveness of mathematics in the physical sciences." McGrath's foundational principles lead one to understand these phenomena as expressions of God's orderliness and providential care for his creation. The chapter on beauty affirms that the beauty of the natural world points us to the beauty of God, and that natural theology must not be so propositional that it neglects affective dimensions. The chapter on goodness offers a thoughtful discussion of the persistence of the concept of natural law and the difficulties it encounters, especially in the light of natural evil.

McGrath's approach awakens the hope that the post-modern recognition of the centrality of interpretation could breathe new life into an ancient but languishing discipline. McGrath is indeed breaking new ground by applying this insight to natural theology, and for that he is to be commended. Unfortunately, however, all of the insights offered in the third part have been thoroughly discussed elsewhere; while his "new vision" provides a helpful way to synthesize some existing understandings, it does not add to them. *The Open Secret* may indeed revitalize natural theology, or it may represent an interesting idea that ultimately proves to be relatively fruitless. Until we see whether it leads to some significant new insights, it will not be clear which it will be. There are many questions at the interface of science and religion that involve interpretation. It would be a

worthy scholarly endeavor to apply McGrath's approach to some of these questions.

Reviewed by James Bradley, Professor of Mathematics Emeritus, Calvin College, Grand Rapids, MI 49546.

Religion & Science

QUANTUM GODS by Victor J. Stenger. Amherst, NY: Prometheus Books, 2009. 292 pages. Hardcover; $26.98. ISBN: 9781591027133.

Victor Stenger's latest book is a follow-up to his 2007 book, "*God: The Failed Hypothesis,*" and it probably does not have much new that Stenger has not written before. In the preface, Stenger says he will concentrate on disproving two concepts:

> *Quantum spirituality* asserts that quantum mechanics has provided us with a connection between the human mind and the cosmos … *Quantum theology* argues that quantum mechanics and chaos theory provide a place for God to act in the world without violating his own natural laws.

The former concept has not been of much interest to ASA and is more a product of Eastern philosophers such as Fritjof Capra and Maharishi Mahesh Yogi. Stenger does a reasonable job of debunking this quantum spirituality. In contrast, Stenger never really argues his case against quantum theology. He repeatedly states that any action by God would violate God's natural laws, but he never explains how he reaches this conclusion, nor does he explore the various ways God could act in nature.

This book is presented using the techniques and tricks of a debater, rather than as an honest attempt to educate the reader. It contains a plethora of extraneous statements, typical in a verbal debate. For example, Stenger repeatedly states that the founding fathers of the United States, including the first four presidents, were deists, not theists. The main purpose of this book is to disprove theism, the belief that God is actively and continuously involved in his creation. Stenger defines "Premise Keepers" as Christian theologians who accept the results of science but "assume that a world beyond matter exists." In this twelve-page section of his book, he summarizes key ideas of twelve of these theologians such as Murphy, Polkinghorne, Barbour, and Davies, making brief comments about each. The final summary is "that theologians have not solved the problem of divine action and they know it." This section of the book is far too brief to be of much value.

Stenger intersperses a lot of physics throughout the text, but I do not see this as being an integral part of his arguments. His extremely negative view of religion creates for him a distortion of the facts. For example, the following misstatement is very revealing.

> Kauffman wants to define a new religion in which "god" is inserted into a cold, lifeless universe. Davies has been sufficiently fuzzy about God in his writings to win the 1995 million-dollar Templeton Prize …

In fact, Kauffman, in his own words, states,

> What about all the aspects of the universe we hold sacred—agency, meaning, values, purpose, all life, and the planet? We are neither ready to give these up nor willing to consider them mere human illusions.

The cold lifelessness of Kauffman's worldview is that his pantheistic god is impersonal. Davies points to the abundant fine-tuning of our universe (anthropic principle) as evidence of purpose and a Creator God, but he does it in such a way that he does not clearly reveal his own personal "subjective" beliefs. This bothers Stenger, since he views all religion as purely subjective. Furthermore, the fine-tuning is never mentioned by Stenger, even when talking about the creation of life.

Let me finish this book review by examining the concepts of time and causation, both of which I have great knowledge. Early in the book, Stenger makes the blunt statement, "Like all the quantities of physics, time is a human invention." He follows this up by saying that a year is defined as 365.2425 days. Obviously, this numerical value is the ratio of the earth's orbital period to its spin period, which is true whether or not humans exist to define it. Later Stenger says, "the arrow of time of common experience is purely a statistical effect" (second law of thermodynamics). Later he says,

> It is important to keep in mind, then, that the universe has no fundamental direction of time. Effects can precede causes and the whole idea of creation, which has a built-in assumption of the direction of time, needs to be rethought.

In between these two quotes, he tries to debunk both Dinesh D'Souza and William Lane Craig's arguments that the universe has a beginning, defined as a first cause in a causal chain. Stenger wants to argue that quantum phenomena do not have causes and that science has done away with the concept of causation. I would like to make it clear that causation is a metaphysical concept, which probably can never be proved nor disproved by science. If events are causing events into the future, then this causation is the dominant human awareness of the arrow of time.

In summary, I view this book, which distorts the truth, as propaganda without novelty. It is not worth reading, except to learn more of how Stenger thinks. The foreword is written by Michael Shermer and the cover has five flattering quotes by such people as Richard Dawkins and Sam Harris.

Reviewed by William Wharton, Professor of Physics, Wheaton College, Wheaton, IL 60187.

NATURE'S WITNESS: How Evolution Can Inspire Faith by Daniel M. Harrell. Nashville, TN: Abingdon Press, 2008. 165 pages. Paperback; $18.00. ISBN: 9780687642359.

The relationship between science and faith has unfortunately been misapprehended by many as incommensurable and even conflicting. Debates on evolution/creation issues, in particular, are especially inflated with much emotion, if not ire, of opponents from both sides. The vast amount of information and data involved can be confusing. Further, people are often forced to choose between evolution and creation as if the decision determines their salvation. In *Nature's Witness: How Evolution Can Inspire Faith*, Daniel Harrell has made a contribution to the

evolution/creation discourse, not by trying to resolve the issue, but by communicating an alternative perspective to people who are struggling with the problem.

In the introduction, Harrell states that the purpose of the book is "to look at Christian faith in the face of evolution as essentially true, as most scientists assert." He intends to rethink and rework his theology in order to arrive at "a more dependable and resilient theology." For Harrell, truth can be sought through God's revelation "both in Scripture *and* in nature." The sentence "all truth is God's truth" keeps surfacing in the book.

With a nonspecialist audience in mind, Harrell prepares the readers for understanding his working theology by first explaining the science of evolution. A reasonable number of topics are covered in this section, ranging from the basics of natural selection, to DNA and fossil evidences, to the Big Bang. It is fascinating to see the anthropic principle being discussed together with evolutionary topics, whereas evolutionary topics are often presented with an atheistic assumption. The science section is followed by a chapter on theology. Harrell rightly points out that the "who" and "why" of creation are theologically more important than the "how." Several problems are raised, such as the apparent incompatibility between the purposelessness of evolution and a purposeful God, and the conflict between evolutionary struggle and a loving God.

Harrell then presents how he sees evolution and faith fitting together. Basically, he advocates that God creates through evolution. Using a Las Vegas analogy, the problem of purposefulness is addressed. "If a casino operator can use randomness to achieve a profitable goal," then all the more can God "use randomness to accomplish his purposes." Regarding the problem of evolutionary struggle and a loving God, God allows freedom in nature "for the sake of creaturely exploration," just as God grants humans free will to choose between right and wrong so that a meaningful relationship of love between God and humans becomes possible. Quoting Gordon J. Wenham's commentary on Genesis, Harrell reconciles the biblical creation account with evolution by pointing out that chapters 1 and 3 of Genesis "don't begin with the phrase 'this is the account,' [and so] these earliest chapters are to be read differently than what follows (*account* meaning 'read this as literal history')." Genesis 2, however, contains an *account* of human appearance, and therefore Adam ought to be taken as a historical figure. Jesus and Paul also regarded Adam as a historical person. Harrell then interestingly suggests that Adam and Eve might "exist as first among *Homo sapiens*, specially *chosen* by God as representatives for a relationship with him."

In the midst of ongoing debates between certain evolutionists and some Christians that are often sensationalized by the media, Harrell's commendable attempt in reappropriating the creation doctrine in the light of modern scientific discoveries is refreshing. Effort is clearly demonstrated to remain faithful to Scripture. Also, the book is written in a style that is easy to follow with story telling, conversations, prayer, and often a humorous tone. There is no problem with information or jargon overload.

Just as with any theology, Harrell's argument is not without loose ends. For example, the analogy between God granting humans free will and nature free will in randomness is not satisfying. Human free will might be essential to a meaningful relationship with God, but nature does not think. Randomness in genetic variation and "creaturely exploration" might not be the parallel process the author suggests.

No matter where one stands on the issue of evolution and faith, there is bound to be something illuminating in this book, if it is read with an open mind. Those who are dissatisfied with the prevailing dichotomy between the subjects will particularly benefit from the book.

Reviewed by Tommy Tsui, PhD (Biology), MDiv (in process), McMaster Divinity College, Hamilton, ON L8S 4K1.

CHANCE OR DANCE: An Evaluation of Design by Jimmy H. Davis and Harry L. Poe. Conshohocken, PA: Templeton Foundation Press, 2008. xx + 236 pages. Paperback; $24.95. ISBN: 9781599471334.

Chance or Dance: An Evaluation of Design is a revised edition of the authors' *Designer Universe,* originally published in 2000. In their preface to this update, they note their surprise that many reviewers interpreted their original as support for the belief that "intelligent design is science." They express concern with the "tendency to confuse all statements about design with the intelligent design movement" and likewise a "tendency to confuse any affirmation of creation with scientific creationism." Considering these two trends as "a problem in the intellectual discussion of ideas" they have responded with this second edition.

Throughout the text there is a clear concern about the fragmentation of knowledge that has taken place in Western culture and its adverse effects on attempts to integrate academic disciplines and different ways of knowing. The authors provide an overview of the history and current status of our understanding of the religious, philosophical, and scientific approaches to the concept of design in the universe. They then proceed to summarize aspects of cosmology, physics, chemistry, biology, and mathematics that have contributed to the perception of design. Finally, a discussion of the intelligent design movement, including an evaluation of its effectiveness, is followed by consideration of other possible implications and responses to the many aspects of our world that can be interpreted as evidences of design.

In the first three chapters, Poe, Charles Colson Professor of Faith and Culture at Union University, considers the historical development of the concept of design in the universe from religious, philosophical, and scientific perspectives. He provides an informative summary of the views that several world religions have had regarding the concept of design, making it clear that "design" has a wide variety of meanings and implications depending on initial worldview assumptions. Next, a panoramic view of the development of ways of perceiving creation begins with Plato and Aristotle and on to Augustine's belief that only God can provide the basis for understanding the world. This contrasts with Descartes' reasoning that leads to "proving the existence of God from nature" and then separation of science and faith. Poe discusses Hume's contribution to the development of naturalism, a move-

ment that would "blossom through the work of Charles Darwin." As philosophical naturalism evolved into science, "it appeared that a formal break had occurred that separated science from the philosophical discussions that had accompanied it since the time of the Greek philosophers."

In chapters 4 through 6, Jimmy Davis, university professor of chemistry at Union University, provides an informative overview of aspects of science consistent with the concept of design. Chapter 4, "A Fine-Tuned Universe," discusses the big bang model and its implications for a beginning to the universe. He then summarizes the properties of Earth that make possible the existence of life on the planet. Davis describes the structure of atoms and molecules and the diversity of life and their implications for the concept of design. In discussing the information content of DNA, Davis states, "The major challenge for those denying design is the origin of the information contained in the DNA." In the context of considering the physical and chemical properties of the universe is also a discussion of the materialistic and the intelligent design responses to the many properties of the universe that can be interpreted to support design, and how these responses depend upon the basic assumptions and worldviews of the observers.

In the last two chapters and Epilogue, Davis and Poe together consider the history, nature, and effectiveness of the recent ID movement, and then provide some thoughtful reflections of their own on the "awe and wonder" of the universe, and implications of the evidence for design. The description of the ID movement and the related citations provide a helpful source of information for those who have not followed this since it began in the early 90s. Davis and Poe clearly do not see ID as science but as an indication of "… the possibility that spiritual reality and physical reality are intrinsically related. The old fragmentation may give way to an older integration." ID may, in fact, have the potential to play an important role in helping bring together fragmented knowledge derived from different academic disciplines. The attempts of the ID movement to identify itself as science may have, in fact, been counterproductive in making it even more likely to be viewed as another attempt to establish a form of scientific creationism.

In stating, "if intelligent design is not yet a scientific theory, it has more than succeeded as a very good philosophy," the authors clearly do not presume to know the future of this movement. On the other hand, they say in the Epilogue, "The renewed interest in design creates an opportunity for a new discussion of the nature of human knowledge that could lead to an integration of ways of knowing which have been largely absent from Western thought since Aristotle disagreed with Plato."

In this book, resulting from the cooperation of a professor of faith and culture and a professor of chemistry, the authors demonstrate a step toward the integration of ideas from separate disciplines. The book provides an excellent introduction to the historical, philosophical, and scientific aspects of the design concept, and the citations provide a very good source for those who would like to learn more about both the ideas related to design in the universe and the interaction between academic disciplines. It is surprising that in the discussion of the fragmentation of knowledge derived from these disciplines, there was no reference to biologist E. O. Wilson's 1998 book, *Consilience: The Unity of Knowledge*. Perhaps this is but another indication of the lack of communication between disciplines? For those who would like to consider the relationship between the fragmented aspects of knowledge, particularly those interested in the ID movement, *Chance or Dance*, is a good place to begin your interdisciplinary search.

Reviewed by Roger H. Kennett, Strohschein Professor of Biology, Wheaton College, and Emeritus Faculty, Department of Genetics, University of Pennsylvania School of Medicine.

ATHEIST DELUSIONS: The Christian Revolution and Its Fashionable Enemies by David Bentley Hart. New Haven, CT: Yale University Press, 2009. 253 pages. Hardcover; $28.00. ISBN**:** 9780300111903.

The new atheism is a significant, albeit troubling, force in contemporary intellectual culture. Its outspoken "four horsemen"—Richard Dawkins, Daniel Dennett, Christopher Hitchens, and Sam Harris—have lashed out against the superstitions and downright ignorance of organized religion, especially Christianity, which, they claim, stands in the way of social progress. There has been no dearth of responses to the new atheists. People as diverse as John Haught, Ravi Zacharias, and Chris Hedges have taken them on. Now a formidable new voice, Orthodox theologian David Bentley Hart, has joined the chorus, objecting to these fashionably antireligious antagonists. Unlike other critiques, however, Hart's does not systematically refute the new atheists' claims. They appear, of course, but he dismisses their polemics as inconsequential and vapid. In *Atheist Delusions*, rather, Hart turns the tables on the new atheists and attacks some of their cherished myths.

His thesis is simple: Christianity was profoundly revolutionary. It effected "a truly massive and epochal revision of humanity's prevailing vision of reality, so pervasive in its influence and so vast in its consequences as actually to have created a new conception of the world, of history, of human nature, of time, and of the moral good" (p. xi). Although Hart makes no claims to offering a comprehensive history of Western civilization, he contends that "Christianity has been the single most creative cultural, ethical, aesthetic, social, political, or spiritual force in the history of the West" (p. 100). But it has also been profoundly destructive. It demolished the very order of the ancient cosmos, and in its place a new world gradually emerged, one that provided "an unimaginably exalted picture of the human person" (p. 213).

Hart reminds us that we live in "the long twilight of a civilization formed by beliefs that, however obvious or trite they may seem to us, entered ancient society rather like a meteor from a clear sky" (p. 169). He is eloquent and persuasive in arguing how subversive and cosmically seditious Christianity was to the Roman world. For example, we easily forget how incredible it was for the Gospel narratives to mention Peter's torment after betraying Christ. The feelings of a Galilean peasant were utterly insignificant in that world. And how scandalous it must have been for these early Christians "to grant full humanity to persons of every class and condition, and of

either sex" (p. 169). We are so familiar with these stories and are so shaped by their sensibilities that we lack the ability to appreciate their utter strangeness and novelty.

Atheist Delusions is an ambitious historical essay that takes particular aim at modernity's smug grand perception of itself as an age of reason overthrowing a superstitious age of faith. While careful to avoid idealizing the Middle Ages, Hart effectively refutes many simplistic and widely-held views about medieval Europe. He concludes that "early medieval society, for all its privations, inequities, and deficiencies, was in most ways far more just, charitable, and (ultimately) peaceful than the imperial culture it succeeded, and, immeasurably more peaceful and even more charitable (incredible as this may seem to us) than the society created by the early modern triumph of the nation state" (p. 86). Continuing this line of thinking, he argues that while medieval Christian society never "fully purged itself of cruelty or violence," it also "never incubated evils comparable in ambition, range, systematic precision, or mercilessness to death camps, gulags, forced famines, or the extravagant brutality of modern warfare" (p. 107).

It should be noted that the triumphal narrative of modernity that Hart pummels is not always sustained by the best historical scholarship. But a simplistic and self-congratulatory account has indeed permeated our modern historical consciousness, and it is clearly evident in the writings of the new atheists. It is commendable to correct such popular misunderstandings, but Hart gives the impression at times that he has selected straw men for some of his rhetorical executions. So in a chapter on the rise of science, he challenges Charles Freeman, who makes the outrageous claim in *The Closing of the Western Mind* that in killing ancient rationality, Christianity set back Western civilization a thousand years. It is not a fair fight. And one wonders whether Freeman is the best opponent? I suspect Hart would argue that he is, because it is people like Freeman whose caricatures of Christianity have influenced the overall intellectual culture and provided the historical framework for the new atheists.

Atheist Delusions may not be everyone's cup of tea. Hart can get carried away at times by the sweeping nature of his argument. Nevertheless, he has written an important, provocative, and often brilliant book that hacks at the roots of the new atheists' arguments with devastating force.

Reviewed by Donald A. Yerxa, co-director of The Historical Society and senior editor of Historically Speaking*, Boston, MA 02215-2010; Professor of History Emeritus, Eastern Nazarene College, Quincy, MA 02170.*

Social Science

SCIENCES FROM BELOW: Feminisms, Postcolonialities, and Modernities by Sandra Harding. Durham, NC: Duke University Press, 2008. 283 pages. Paperback; $23.95. ISBN: 9780822342823.

In *Sciences from Below: Feminisms, Postcolonialities, and Modernities*, Sandra Harding attempts to bring together the study of modernity with feminist and postcolonial thought. By considering the arguments and positions of these disciplines simultaneously, she argues convincingly that these independent areas of thought can be even richer and more relevant. Harding is a renowned scholar in the fields of feminist, postcolonial, and standpoint theory, and in their application to science studies. She earned her PhD in philosophy from New York University, and is currently professor of women's studies and education at the University of California, Los Angeles.

The book is organized into three distinct sections. In Part 1, Harding highlights the work of three theorists of modernity: French ethnographer and philosopher of science Bruno Latour, German sociologist and advocate of "risk society" Ulrich Beck, and a team of European sociologists of science headed by Helga Nowotny, Peter Scott, and Michael Gibbons. With a chapter devoted to each theorist, Harding outlines the arguments from each school of thought. In each case, the original authors seem to recognize the need to discard the general idea that technological advances alone signal modernization. By equating technology with modernization, one is required to define "modern" as a single state of being relative to a time before a particular piece of technology was invented. Each of these authors understands that this simplistic view lacks the nuance that is required to properly characterize something as modern. Given that it is only possible, by this definition, to be modern in comparison to something else, these authors argue for a view of modernity that is multidimensional.

Since there are many different traditions, environments, and situations that can exist prior to modernity, there must be multiple modernities, each relating to a specific past. Harding supports this argument fully, but questions whether it goes far enough. As members of the dominant Northern[1] science studies community, she argues that these theorists may not have enough perspective to truly consider the roles of non-Northerners and women in modern society. In each instance, she contends that if these writers were to engage with feminist and postcolonial theories, they would find additional depth for their arguments. Without doing so, Harding suggests that these studies of modernity are truncated and therefore less likely to result in actual reform. As presented, none of these theorists, including Harding herself, have given much consideration to the role that religion plays in modernization.

In the second section of the book, Harding presents three chapters, covering the relevant literature from feminist science studies, postcolonial science and technology studies, and feminist postcolonial science and technology studies. These chapters provide an excellent summary of the state-of-the-art thinking in these fields, and may be useful either as a primer for those who are new to the field or as a good review for those already working in the area.

In the final section of the book, Harding begins to draw all of these ideas together to address the concept of modernity and its relation to science and technology. She argues strongly from a postcolonial perspective that there are, and indeed must be, as many conceptions of modernity as there are cultures to be modernized. As each culture's history differs, so too must their sense of modernity. Harding continues this argument by evaluating the role that gender has played in conceptualizing times of modernization. She points out that "progress"

is generally categorized by a shift in power to include a group of people who were previously considered to be lesser. She points out that for one group to gain authority, another group generally must forego theirs. Often during history, it has been women who have paid the heaviest price for such progress. For example, the modernization of medicine moved healthcare out of the home and into hospitals where doctors (male) were in charge of care rather than the women who had been the care givers previously. In this way, women's role and value were reduced as we moved into a more "modern" situation. This idea makes a strong argument for redefining what constitutes modernity, and requires us to question whether all people, male and female, Northern and Southern, are really treated as "fully human" when we determine what constitutes a better and more modern society.

Finally, Harding closes with a chapter in which she attempts to look into the future with the goal of "trying to keep simultaneously in view some five different kinds of research agendas which do not much include each other's concerns" (p. 215). She recognizes the need to shed the binary between tradition (the old) and modernity (the new). She argues that as long as tradition is viewed as the antithesis of modernization, then those whose job it was to maintain the traditions of the past, largely women and non-Northern men, will continue to be marginalized and their ideas viewed as less significant than those associated with Northern science and technology. One of her goals seems to be to direct our attention to how research questions are chosen, and to point out that Northern science and technology have long dominated the discussion as to what type of knowledge is considered to be "science." She contends that most research agendas are controlled by funding and are therefore dictated by those fields and questions of greatest interest to historically male-dominated Northern institutions. As such, the concerns and interests of Northern women and non-Northern populations tend to be ignored. Unfortunately, this has led to a single view of what constitutes science, and, by analogy, a modern society. Harding stresses that we must be willing to engage scientific questions from groups outside this dominant Northern male culture before we will be able to move forward and truly engage modernization.

I believe that this book serves to bring the efforts of modernity studies into focus with feminist and postcolonial studies of science. In this way, Harding has created a bridge for practitioners in these fields to easily consider the arguments and richness provided by the others. It seems that a work of this nature is long overdue and, will significantly improve the communication between modernity theorists and those working in feminist or postcolonial studies. I would caution, however, that while Harding's writing is generally easy to follow and her arguments and examples are illustrative, this text might be a bit challenging for those not already "fluent" in feminist theory.

Note

[1]In feminist and postcolonial thought, "Northern" science studies are contrasted with "Southern" science studies. As such, northern populations and northern science can be roughly equivalent to the more familiar conception of Western thought and science.

Reviewed by Carolyn Anderson, Assistant Professor of Chemistry and Biochemistry, Calvin College, Grand Rapids, MI 49546. ⊙

Book Notice

A CORD OF MULTIPLE STRANDS: An Evidence-Based Assessment of Christian Truth Claims by Kenell J. Touryan. 2008. 48 pages. Paperback; $5.00.

For the right audience, an audience that is indeed of particular interest to *PSCF* readers, this essay is unique and engaging. On behalf of the Department of Energy (USA), Kenell Touryan (current Fellow and former President of the ASA) was helping post-Soviet-bloc nuclear scientists to redirect their skills to civilian research. He had many opportunities to discuss with them what matters most in life, and particularly wanted to show them that science is not contrary to Christian faith. To spur on those conversations, he first wrote this essay in Armenian and Russian. Now translated into English, these packed forty-eight pages can reach scientists in the English-speaking world as well.

The essay is written for capable and busy colleagues. Touryan is free with university-level vocabulary such as "innate sense of the nouminal" and "ontological naturalist." Further, he assumes that his readers will recognize scientific notation and concepts such as time dilation, the Plank energy constant, and quantum mechanical wave function coherence. For his audience, the many examples from the sciences will be intriguing in themselves, and make concrete Touryan's thesis that science and Christian faith are compatible. One of the first sentences of the essay is that "almost every major breakthrough in science and technology, especially in chemistry, physics, and thermodynamics was accomplished by persons who exhibited a strong faith in a Creator." An exemplary list then follows.

Basil Mitchell or Alister McGrath would probably call Touryan's approach "comprehensive coherence." Touryan calls his argument an evidence-based assessment with multiple strands to form a cumulative case. Evidence is cited from the physical world, human nature, history/archaeology, historical context of the Gospels, the unique person of Jesus Christ, and personal experience of God. Touryan states that each of these lines is "necessary but not sufficient." It is likely that he means that together they make a strong case (sufficient), not that if one strand is rejected, the argument is lost (necessary).

His citations are consistently relevant and respectable, even if not always including the latest sources. The first appendix describes a hierarchy of knowledge with theology at the apex, and the second appendix uses a striking illustration from solar radiation to describe what God does through the cross. Short and to the point, with references to wide scholarship, this essay could serve as a stirring invitation to conversation with colleagues in the sciences. Touryan generously makes copies available at cost at PO Box 713, Indian Hills, CO 80454.

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