



ENVIRONMENT

HOPE IN THE AGE OF CLIMATE CHANGE: Creation Care This Side of the Resurrection by Chris Doran. Eugene, OR: Cascade Books, 2017. 247 pages. Paperback; \$31.00. ISBN: 9781498297028.

Chris Doran is Associate Professor of Religion at Pepperdine University in Malibu, California. His research and teaching have focused on a variety of areas related to the interaction between theology and science. His current work centers upon developing theological responses to climate change and its effects on the totality of God's creation. His main argument in this book is that it is easy to become hopeless when contemplating the destruction that climate change will bring to humans, nonhuman creatures, and the rest of creation. However, he argues that hopelessness "should not appear plausible or even reasonable to Christians who believe in the resurrection of Jesus" (p. 15). According to Doran, resurrection hope provides the foundation for creation care, and the third chapter of the book is devoted to an explanation and justification of this linkage.

A large portion of the book focuses on two particular issues of concern: the idol of economic growth, and the American association with food. In chapter six, Doran describes the "neoclassical economic model" which is based upon the assumption that persistent economic growth will provide everyone with the opportunity to achieve prosperity. He presents a number of reasons why Americans continue to consume in spite of the fact that they are not happier than other peoples in the world. One reason, simply stated, is that we define prosperity solely by our ability to consume goods and services. Another reason we consume so much is that the "priests" of the neoclassical worldview rely on a sophisticated group of advertisers and marketers who effectively shape consumer desire. This priesthood also maintains the idol's prominent position in our society by claiming that economics does not depend upon ethical presuppositions and can therefore be considered an objective science. In addition, this worldview presupposes that humans are individuals who make rational decisions based on self-interest and that the economy prospers when this so-called rational decision-making process is allowed to flourish. The neoclassical economic model is also based on the idea that scarcity is pervasive, which naturally leads to competition between humans and corporations. Finally, this worldview presumes that economic growth always generates useful technology and that technology will always be able to solve any problems that it might create.

Doran concludes chapter six by arguing that the neoclassical model of economic growth is founded upon faulty presuppositions and that it is a system stricken by hopelessness. He asserts that economics is not just about money, but it is also a justice issue. It is about sharing resources among all who need them, rather than encouraging developed-world citizens to live luxurious lives that fail to discern the real difference between wants and needs. Chapter seven then summarizes the characteristics of an economy of hope that includes the goals of justice, sustainability, ecological health, and climate change mitigation. Most of the chapter is devoted to the practice of one specific virtue that can help us live more hopefully. That virtue is frugality, a "subversive" virtue, which "strikes at the core of the idol of economic growth as it impugns our cultural belief in the idol's innate goodness and capacity to deliver on its many promises" (p. 136). Doran quotes a number of the church fathers who, while not using the term "frugality" explicitly, do spend a considerable amount of time explaining the relationship between humans and their possessions from a Christian perspective. For all of these church fathers, the purpose of human life is not to consume or accumulate but to do justice. Frugality, then, is the Christian expression of hope in a God whose abundance is sufficient if we are willing to live in such a way that distinguishes needs from wants and that creates the space to share with others, including the nonhuman creatures that inhabit our planet.

The second major issue of concern raised in the book is the American association with food, the subject of chapter eight. Doran delineates a number of problems that are associated with food production and consumption in the United States. Consumption issues include the massive amount of food that is wasted, the staggering amount of meat that Americans eat, and the fact that this country is one of the most obese nations on the planet. Food production concerns include the massive use of artificial fertilizers, soil erosion, pesticide runoff, and water pollution, all of which are closely associated with monoculture agriculture. Doran quotes Norman Wirzba who contends "that we have given food production and consumption over to the modern idols of control, efficiency, and convenience" (p. 151). The main targets of Doran's critique are the nation's many confined animal feeding operations (CAFOs) which treat animals inhumanely, and the entire meat-processing industry that pays human workers low wages while exposing them to numerous health hazards. The chapter concludes with a timely reminder from the church fathers that gluttony was once known as one of the seven deadly sins.

Book Reviews

In the chapter that follows, Doran lays out a number of reasons why eating should be an act of Christian hope. While he does not conclude that eating meat is immoral, as some vegetarians often presuppose, he does argue that American Christians should reduce their meat consumption significantly and should completely refrain from eating meat that comes from CAFOs. In order to eat hopefully, Christians should be aware of two important considerations: the care of the animal to be eaten, and the welfare of the humans that raised and slaughtered it. If Christians choose to eat meat, they must be willing to pay more for it by demanding that they will eat only meat “that makes dignity possible for the least of these” (p. 189). Reconnecting to the moral and theological aspects of eating through participation in the Eucharist should cause us to remember how eating connects us to our neighbors, to other creatures, and ultimately to God.

While the issues of economic growth and the American association with food are the main topics of this book, other aspects of creation care are also addressed. The biblical basis for describing God as Creator and Redeemer is presented in the first two chapters. God’s care for nonhuman creatures, the Incarnation’s affirmation of the goodness of the entire creation, and the concept of cosmic redemption are all discussed. In chapter four, Doran critiques the idea that humans are to be stewards of God’s creation. After surveying other options, he examines a single virtue in chapter five that may help us be Christians “who better witness to the creation-care work the resurrection inspires us to perform” (p. 90). This virtue is humility, the recognition of one’s proper place in God’s plan for the universe. The book concludes with two chapters that describe several ways the church can be a beacon of hope in this age of climate change.

While all Christians need to be confronted with the central themes that are raised in this book, it appears to be written primarily for use in college-level courses that address the subject of sustainability from a Christian perspective. The book includes an extensive bibliography, and footnotes appear on nearly every page. The author draws on the Bible, the church fathers, and modern theologians to develop a thoughtful and practical ethic of creation care. The main message of the book, as stated on the back cover, is that “Christians should think, purchase, eat, and act in novel and courageous ways because they are motivated daily by the resurrection of Jesus.” Unfortunately, far too many Christians fail to connect their belief in the resurrection with the daily witness of their faith, particularly as it relates to issues of creation care. Hopefully, reading this

book will encourage many to make the connection and then to respond with action.

Reviewed by J. David Holland, Clinical Instructor, Department of Biology, University of Illinois at Springfield, Springfield, IL 62703.



HISTORY OF SCIENCE

DREAMERS, VISIONARIES, AND REVOLUTIONARIES IN THE LIFE SCIENCES by Oren Harman and Michael R. Dietrich, eds. Chicago, IL: University of Chicago Press, 2018. 324 pages. Paperback; \$40.00. ISBN: 9780226569901.

I have always been intrigued by scientists who were able to think outside established paradigms to advance scientific knowledge, and I have always wondered what gives them this ability to think outside the box. For example, what convinced Barbara McClintock that chromosomes could be broken and rejoined, whereas the rest of the scientific community believed that intact chromosomes were critical for passing on genetic information properly? What gave Judah Folkman the stubborn persistence to pursue anti-angiogenic molecules when they eluded him for so long, and the rest of the scientific community thought he was pursuing a phantom? Questions like these piqued my interest in *Dreamers, Visionaries, and Revolutionaries in the Life Sciences*, which explores scientists whose work, theories, or methods made them stand out from their peers as something other than “run of the mill.” This is the third book in a series of three, the first of which focused on scientists whom editors Oren Harman and Michael R. Dietrich describe as rebels, mavericks, and heretics. The second focused on innovative, outsider scientists. This book highlights eighteen individuals the volume’s editors deem scientific dreamers, visionaries, and/or revolutionaries. The eighteen people are divided into six subdisciplines: evolutionists, medicalists, molecularists, ecologists, ethologists, and systematizers, placing three in each subdiscipline, although many could well be placed in more than one of these groupings.

The eighteen individuals highlighted range from historically important scientists (Jean-Baptiste Lamarck) to scientists whose contributions are quite recent (David Sloan Wilson). They include scientists who followed a typical educational and professional pathway, such as Ilana and Eugene Rosenberg, to those whose pathway was quite atypical, such as Jane Goodall who skipped a bachelor’s degree altogether. The dreamers, visionaries, and revolutionaries even include Mary Lasker, who was not a scientist at all but an important health advocate.

Among my favorite chapters is “Jonas Salk: American Hero, Scientific Outcast” (chap. 5), whose hero was Louis Pasteur because Pasteur conquered disease using creativity, perseverance, and concern for humanity (p. 85). Salk’s life was shaped, in large part, by stories of pogroms, witnessing the 1918 flu pandemic, and his Jewish faith, which taught him that people are defined by the good works they do. He was ambitious, meticulous, tenacious, persistent, and took calculated risks. He had the audacity to challenge the science of the day. He questioned dogma. He was able to envision a world in which diseases such as polio were not a threat.

Other favorites include the chapter describing Mina Bissel’s work on extracellular matrix and signaling molecules, which compelled scientists to consider both genes and cellular environment to explain cell behavior. I learned that Ilana and Eugene Rosenberg’s work led to the explosion in our understanding and interest in microbiomes, and that it was the vision of Margaret Dayhoff that laid the groundwork for the sequence databases many of us depend on today. Visionaries Rachel Carson, Jane Goodall, John Todd, and James Lovelock still have important lessons to teach us as we face increasingly alarming global environmental crises.

I appreciated the number of women included—six if you include Ilana Rosenberg (the subject of chapter 18, along with her husband). The authors often pointed out that these women worked around family obligations and that these outside responsibilities did not hamper their scientific contributions. Rather, in many cases, being mothers gave these women eyes to see what others missed. I noted that many of the subjects benefited from interdisciplinary or cross-disciplinary work—something those of us at liberal arts institutions should advertise! The visionaries were creative, thoughtful, and passionate. They welcomed competing/alternative viewpoints and collaboration. As outcasts themselves, many of the dreamers in this book were extraordinarily inclusive.

The book ends with an epilogue in which Joan Roughgarden insightfully identifies seven distinct features of scientific dreaming and dreamers. The first feature is that “scientific dreamers sense that something is wrong, dreadfully wrong, with contemporary science” (p. 305). Her claim reminded me of a sermon series my pastors recently led at our church. They dedicated their 2019 Lenten sermons to lament. In one sermon focusing on Lamentations 2, our pastor argued that to be a visionary, a person must practice lament because in lament, we envision a world more like the one God desires, and we are compelled to act in such a way as to bring our

current reality more in line with that vision—with God’s vision. A Christian in the Reformed theological tradition, I see common grace at work in the lives of the subjects of the eighteen chapters of this book. Whether these scientists were people of faith or not, they saw something that was dreadfully wrong with how we interpret the world, with the human condition, or with how we interact with the natural world. Then, they used science as a tool to right the wrong they identified. Perhaps this is a lesson for Christians who want to integrate faith and science meaningfully. Practice lament, identify places in our world that do not match God’s intent, and use science to work to make reality more closely match God’s vision.

I will recommend this book to graduate students and undergraduate students with an eye on graduate school as an incentive to embrace the features of scientific dreamers, visionaries, and revolutionaries.

Reviewed by Sara Sybesma Tolsma, Professor of Biology, Northwestern College, Orange City, IA 51041.

UNBELIEVABLE: 7 Myths about the History and Future of Science and Religion by Michael Newton Keas. Wilmington, DE: ISI Books, 2019. 256 pages. Hardcover; \$27.95. ISBN: 9781610171533.

Several years ago, while in Singapore on sabbatical, I needed to hitch a ride to a lecture at one of the local universities; I jumped into the back seat of a car driven by a rather well-known MIT physicist. As we sped off, somehow the conversation in the front seat turned to the “Dark Ages” and how foolish it was that people could believe that “the earth was flat,” according to the driver. At the time, I knew that the presumption was off the mark, but I did not have the facts at my fingertips to enter into the conversation. Had I possessed this book, I would have had plenty to say. The truth, of course, is that, as elaborated in chapter 3, it has been pretty universally held from the time of the ancient Greeks that the earth is round. I remember thinking, how can there be such ignorance in the context of criticizing ignorance? In a sense, that is what the book is all about.

Unbelievable, by Michael Newton Keas, is part of a genre which has grown over the past few decades to debunk a number of misconceptions about science and history, not least of which is the claim that science and religion are at “war.” (Indeed, in the last chapter, Ron Numbers is quoted as saying, “The greatest myth in the history of science and religion holds that they have been in a state of constant conflict.”) All the myths in the book somehow serve this conflict image, and though they may be propagated in ignorance, the beliefs are often held by those who have an agenda. In contrast to some other books in

Book Reviews

this genre that have multiple authors, this book has only one, and this gives it a coherence not always achieved elsewhere. The content contains a mixture of original research (e.g., studying historical textbooks going back more than two centuries, with some reference to original texts) and reliance on the work of other historians. In addition to the main historical story, an interesting feature is the side story of how misconceptions have been reported in textbooks over the years, even continuing to the present.

In Part 1, the book focuses on seven “myths” concerning history, science, and Christianity. In order, the myths treated are (1) the medievals thought of the universe as small and that somehow small was inferior; (2) the medieval period is justifiably considered “dark” with regard to knowledge; (3) medievals believed the earth to be flat; (4) Giordano Bruno should be considered a martyr for science; (5) Galileo was imprisoned for his science; (6) a Copernican view constitutes a demotion and humbling of the medieval view because it removes us from the center; and (7) when we meet extraterrestrial beings (ET), the meeting will bring about a kind of scientific enlightenment.

When I first encountered the book, I was not sure why these particular myths were chosen, and why they were ordered in this way. However, upon reading, I found that the myths and their ordering constitute a natural progression, from one to the next. And in a certain sense, these seven myths constitute a suitable representative sample to stand in for the many that could be discussed. As stated later in the book, the first three myths belong to the medieval period, whereas the next three are associated with the early modern period. The last relates to a yet future hypothetical event, one that is talked about with a kind of secular religiosity in passages quoted. In many cases, you can see a progression; once a myth is created, it gets picked up and propagated by those who would like to promote a particular cause. Most of these myths are myths in the usual sense of a false story. But the last falls into another category, as an “imaginative archetypal story that shapes a culture’s identity and dominant worldview” (p. 5).

Following Part 1, the second part of the book is devoted, in part, to the question of why the myths continue to be propagated, and, in part, to an elaboration of the misconceptions in order to place them within a fuller context. Much of this second part adds to and enhances the arguments in the first part. For example, in the first chapter, the theme of ET is revisited and tied to a science fiction theme, and the next chapter discusses how science television shows such as *Cosmos* (both the Sagan version and the Tyson

version) propagate the theme that science represents progress, putting it in opposition to the “outmoded” religion of the past. A later chapter reveals one of the more interesting facts. In considering a large number of textbooks used in American education, from the seventeenth century to the present, virtually none of the myths appeared until around the early nineteenth century, suspiciously closely following the so-called “Enlightenment” period. One of the earliest texts discussed is one written by Kepler, which is portrayed as a splendid example of compatibility between science and Christianity.

I have read other books in this general genre, yet I still learned much from this one. Aside from the usual stories of Bruno and Galileo, there are also lesser known stories such as Sagan’s use of Hypatia to justify an imagined war between science and Christianity, and Tyson’s telling of false historical stories to justify his position, a practice surprisingly endorsed by historian Joseph D. Martin for the “greater good” (p. 152).

Who might be interested in reading the book? I would recommend it to anyone who is interested in the history of science and Christianity in general. In particular, Christians in science can benefit from the broader theme of knowing what the myths are that continue to be propagated, with an eye toward revealing them to others when the subjects come up. If you have not read much on this subject, this book would be a good place to start.

Reviewed by Donald N. Petcher, Professor of Physics, Covenant College, Lookout Mountain, GA 30750.



THE PHYSICS OF EMERGENCE by Robert Bishop. San Rafael, CA: Morgan & Claypool, 2019. 112 pages. Paperback; \$50.00. ISBN: 9781643271538.

What options are available when thinking about the physical and material universe? Are all phenomena and behaviors reducible to the fundamental laws of nature, perhaps in a single comprehensive materialist “theory of everything”? Or must any comprehensive account of the material universe be necessarily dualist, perhaps even one in which physical theory needs to be supplemented by some type of non-material essence or possibly by divine intervention? Or is there a middle way, one in which reductionism is inadequate and dualism unnecessary? In this book Robert Bishop affirms the latter by arguing that the structure of physics itself indicates that the universe displays contextual emergence, a type of emergence in which lower-level structure is insufficient to account for higher-level properties and behavior,

owing to the role contextual and contingent factors play in shaping higher-level structure.

Bishop, currently John and Madeleine McIntyre Endowed Professor of Philosophy and History of Science at Wheaton College, is well positioned to address such a challenge. He earned a BS and MS degree in physics and a PhD in philosophy, all from the University of Texas at Austin. He specializes in the foundations of the physical and social sciences, particularly on determinism and free will, irreversibility, and theories of mind and consciousness. Bishop codeveloped the concept of contextual emergence along with Harald Atmanspacher (Robert C. Bishop, "Patching Physics and Chemistry Together," *Philosophy of Science* 72, no. 5 (2005): 710–22; Robert C. Bishop and Harald Atmanspacher, "Contextual Emergence in the Description of Properties," *Foundations of Physics* 36, no. 12 (2006): 1753–77). In *The Physics of Emergence*, Bishop further explains the concept and argues that it is grounded in physics.

Given the checkered history of the concept of emergence with a spectrum of diverse meanings, any work on emergence is well served by explaining its use of the term. Bishop does so clearly and succinctly in the introduction and first chapter. He notes the common belief among the scientific community in reductionism, whereas emergence denies these reductionist views without resorting to dualism. Essentially, reductionists believe "that everything else in the Universe reduces to the play of elementary particles under elementary forces (or the action of quantum fields)" (p. xii). In contrast, emergentists believe that fields such as condensed-matter physics, biology, or psychology study phenomena that "aren't explainable or derivable from elementary particles/forces ..." (p. xii).

In the first chapter, Bishop provides a brief but helpful history of emergence. He cites key comments from luminaries such as Einstein, Pauli, Schrödinger, Anderson, and Laughlin that indicate an openness to emergence while the scientific community tended to hold firmly to reductionism.

In the second chapter, Bishop wastes no time in addressing the primary objection usually raised against emergence, namely "the belief in the *causal closure of fundamental physics* (CCFP)." In other words, knowing only the elementary laws of nature and the initial conditions, the subsequent evolution of any system over time can be determined. No contextual or external factors are needed. The universe is thought to be fully explained by "bottom-up" factors. Bishop points out that there are two basic assumptions in this objection:

Atomism: *Law-like regularities of macrostates are fully determined by the law-like regularities and micro features of microstates in all cases regardless of context.*

Context freedom: *All features of macro contexts are fully determined by context-free features of the underlying law-like features of microstates.* (chapter–page, 2–5)

The rest of the book is a thorough refutation of the CCFP and related objections to emergence. Chapter three is devoted to showing specifically how factors that cannot be derived solely from fundamental laws are necessary for understanding complex phenomena. Chapter four presents several case studies illustrating the need for higher level contexts in physics. One of the examples he describes is the very concept of temperature which depends on stability conditions that are not often articulated in statistical mechanics.

In chapter five, Bishop returns to the objections to contextual emergence he earlier listed in chapter two and convincingly dispenses with them, arguing that, without contextual information, the fundamental laws are inadequate for explaining the world around us. Finally, Bishop concludes with chapter six, in which he discusses the broader implications of contextual emergence. In biology, for example, collective interactions of large ensembles of microbes, cells, or biomolecules set the contextual conditions for novel structures to emerge.

Though the book is short, it is decidedly not a casual fireside read. A solid grounding in theoretical physics and philosophy is helpful in following the key arguments and examples. Nevertheless, going beyond the details of his argument to the big picture, Bishop has provided us with a powerful, seminal work. He has given us a compelling refutation of the reigning perspective of reductionism, together with a rich new paradigm of contextual emergence for a path forward in understanding our universe.

As he explains, the laws of nature provide a necessary but not sufficient set of conditions for behavior and properties at a larger scale. The specific context of an application of those laws provides additional necessary and sufficient conditions for the behavior of that system. That is, the characteristics we observe at a larger scale emerge from the laws of nature operating in a specific context that is related to but not derivable from the fundamental laws.

Another important implication relates to the understanding of determinism and free will. Bishop shows how the laws of nature in and of themselves are neither deterministic nor indeterministic. Rather, "... contextual emergence makes explicit that determinism and indeterminism are contextually-emergent

Letters

features of our world as opposed to an absolute feature of the Universe" (chapter-page, 6–17). In some contexts, the laws of nature, such as the Newtonian laws of motion, lead to systems that are deterministic while in other contexts they do not. Thus, "determinism is a contextual feature of reality" (chapter-page, 6–11).

Finally, dualism is not required to explain complex phenomena that cannot be derived solely from fundamental laws. Rather, the conditions that emerge from the interaction of an ensemble of components provide the contexts in which the lawful behavior of nature produces those phenomena. Contextual emergence recognizes the top-down conditions that influence the bottom-up work of the laws of nature. Those conditions are not independent of but are related to the fundamental laws and particles of which the system is composed.

Bishop has laid the philosophical foundation in physics for the rich concept of contextual emergence. It is likely to bear much fruit in the future as it is applied to all the domains such as biology and sociology in which we describe our universe.

Reviewed by Randy Isaac, ASA Executive Director Emeritus, Topsfield, MA 01983. ♥

Letters

Doubting Miller's Doubt

Keith Miller's article "Doubt and Faith in Science and Religion" (*PSCF* 70, no. 2 [2018]: 90–100) is informative, well written, and realistic. The author is well versed in the subject of science and religion. Unfortunately, I do have a problem with the basic concept of his article which is that "scientific inquiry and religion are founded on the acceptance of fundamentally unprovable assumptions." However, many actual observations and actual experiences are not based on assumptions at all.

The following simple scientific inquiry is a typical example: I hold an object in my hand. I want to know if it floats in water. In order to find out I have to perform an experiment. I place the item in a pail filled with water. I observe that it sinks. My knowledge of the universe has been increased by performing this experiment. I now know that the item sinks in water. There is no doubt in the result of this experiment. This scientific inquiry was not founded on basic assumptions because it did not use any assumptions at all.

Scientific knowledge and religious knowledge based on actual observation and/or experience are not founded on assumptions and are therefore not subject to correction and change. Their explanations may be founded on unprovable assumptions and may be subject to correction and change.

Martin Huizinga
ASA Member

Miller Replies

In his letter responding to my article "Doubt and Faith in Science and Religion" (*PSCF* 70, no. 2 [2018]: 90–100), Martin Huizinga argues that many actual observations and experiences are not contingent on any assumptions. However, this comment illustrates one of the primary points that I made in the article. That is, there are fundamental unprovable assumptions that underlie all knowledge. These assumptions are often held without any conscious awareness. In using observations to construct our understanding of the natural world, we depend on the assumption that our senses provide true information about an external physical reality. In fact, we must assume that an objective physical reality that is accessible to us even exists. This is not trivial.

The equivalent in the pursuit of religious truth, is the assumption that there is a "supernatural" reality. For Christians, that assumption includes the existence of a personal transcendent creator God who is also immanent in the natural world. All our subsequent knowledge must start there.

Keith B. Miller
ASA Fellow

 ♥

Perspectives on Science and Christian Faith Three-Year Index

The three-year *PSCF* index will no longer be published in the journal. The last one was published in the December 2016 issue. An index for each issue is available online by clicking on "Dynamic directory of *PSCF* articles and tables of contents" found at <https://network.asa3.org/page/PSCF?>
