

process and corrected, so it's unfortunate that they weren't.

The purpose of the book is largely to present the scientific facts regarding human origins so that we can determine their impact on core theological precepts of the Christian faith. Here, too, I think the author is guilty of overreach. He concludes his discussion of the science by stating, "for those who choose to believe that mankind has indeed evolved, there are going to be tremendous changes needing to be made in their theology" (p. 187). As John Walton (*Lost World of Adam and Eve*), N. T. Wright (*Surprised by Scripture*), Dennis Venema and Scot McKnight (*Adam and the Genome*), and Joshua Swamidass (*PSCF* 70, no. 1 [2018]: 19) have all shown, the changes to theology mandated by the findings of evolutionary biology and paleoanthropology need not shake up theology in any major ways. Science is silent on the issue of a historical Adam and Eve as discussed thoroughly by each of these scholars. It is clear that our species has been created through the evolutionary process, but there are various ways of thinking about Adam and Eve that do not conflict with these data. I am concerned that the author has allowed factors other than science to influence his conclusions. For example, consider also this statement:

... some will choose to believe that we humans are indeed the pinnacle species in God's creation, and in support of that they will refer to biblical passages like Psalm 8: "What is mankind that you are mindful of them, human beings that you care for them? You have made them a little lower than the angels, and crowned them with glory and honor." They may be right. I won't deny that. But I will point out to them that it was a human that wrote that passage about humans: dolphins might believe they are the pinnacle species. (p. 178)

I think this book is an important example of a highly distinguished scientist who is still on a search to find how best to fit his sophisticated knowledge as a scientist into the Christ-centered, Spirit-filled life he has experienced and found to be real. I think it was published a little prematurely, but it illustrates the journey that all of us in the sciences must take. This is especially difficult for someone who rises to the upper tier of the sciences at a nationally important university where time pressures are enormous as one tries to fulfill responsibilities to family and church, along with those of a high-pressure career. I commend Janssen for doing this so well. This book is an admirable step along the journey that all of us are taking and what is most important of all is that we have mechanisms in place to provide mutual support to one another with each step we take. This is especially important for those whose journey

takes them into the cauldron of a first rate research university.

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SCIENCE AND RELIGION

THE BELIEVING SCIENTIST: Essays on Science and Religion by Stephen M. Barr. Grand Rapids, MI: Eerdmans, 2016. vi + 226 pages. Paperback; \$25.00. ISBN: 9780802873705.

Stephen Barr is professor of theoretical physics at the University of Delaware, fellow of the American Physical Society, member of the Academy of Catholic Theology, and author of *Modern Physics and Ancient Faith* (University of Notre Dame Press, 2003). This book is a collection of twenty-six of his pieces from 1997 to 2013 (11 essays, 13 reviews of 15 books, and 2 unpublished lectures), most of which are previously published (15 appear in the *First Things* journal and/or blog). The pieces range from four to twenty-two pages in length, averaging eight pages each, with only three being over ten pages, making for rewarding piecemeal reading. The stand-alone essays can be readily included in undergraduate courses needing to provide engagement with perspectival faith-based reflection and critical thinking. The book adds fifteen pages of notes (mostly contextual explanations and updates) and citations for direct quotations, but lacks an index and any new content.

Chapter 1, "Retelling the Story of Science," is Barr's Erasmus Lecture delivered in New York in 2002 and serves as the introductory essay. As in his 2003 book, he describes five main themes of materialism, and their reversals via "plot twists" in the actual history of science. First, the idea that science overthrew religious cosmology was reversed by big bang theory and the scientific consideration of a beginning. Second, while the idea that mechanism nullifies teleology had growing support in terms of considering laws of physics apart from a lawgiver, many now find the simplicity and aesthetic form of the mathematical principles of physical law evocative of a divine designer. Third, the "dethronement of man" and a universe without purpose, which claimed scientific support in the randomness of events, lost credibility due to the "anthropic principle" and a fine-tuned universe. Fourth, the notion of a closed universe with physical determinism gave way to an open universe upon the rise of quantum mechanics with its uncertainties. Fifth, the view of the human person as machine, with the brain simply running biochemical reactions, is now less tenable due to

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both the recognized role of the (human) observer in quantum physics and thus the inability of quantum physics to describe systems including humans, as well as Lucas's argument from Gödel's theorem that humans, unlike machines, can at least sometimes recognize their own internal consistency.

These themes and plot twists are detailed and addressed in various ways in most of the remaining chapters, which are divided into seven sections: Evolution (7 pieces); Mind and soul (7); The big bang and creation (3); Reductionism (2); Science as a substitute for religion (2); Finding God through science (2); and Mischievous myths about scientific revolutionaries (2). Throughout, Barr criticizes the reductionist, scientific, and antireligious claims of Dawkins and other public figures, and presents his own perspective offering scientific, historical, philosophical, and theological correctives. His book reviews (on Thomas B. Fowler and Daniel Kuebler, Richard Dawkins, Stephen Jay Gould, Michael J. Behe, David Chalmers, Thomas Nagel, Malcolm Jeeves and Warren S. Brown, John Maddox, Edward O. Wilson, Patrick Glynn, Gerald L. Schroeder, Francis S. Collins, William R. Shea and Mariano Artigas, and Wade Rowland) and other essays are incorporated within these sections.

Barr delivers well-placed, incisive, and often witty criticism of "scientist-atheists" such as Dawkins. He ends his review of Dawkins's *A Devil's Chaplain: Reflections on Hope, Lies, Science, and Love* by writing,

Dawkins's atheism and materialism ... prevent any coherent viewpoint from emerging because they deny the spiritual soul in man. That soul ... makes it possible for us to have that hope and love to which the subtitle of Dawkins's book refers, but which are absent from its pages, and about which he has nothing in the end to say. (p. 41)

His review of Gould's *Full House: The Spread of Excellence* includes a few zingers, poking fun at Gould's idea that bacteria are more successful than humans (because there are more of them than us) by asking why this is not the Age of Air, given that there are more air molecules than bacteria, and whether "the fact that cosmic evolution has produced more dust particles than Chinese [persons] tells us something?" (p. 43), and that thus "Gould's ideas could be said to be but a twig on the arborescent bush of human opinion" (p. 44). And noting that Gould's book does not "complete the Darwinian revolution," as Gould aims to do, Barr "recommend[s] it ... for those who take pleasure in fossils" (p. 45).

A devout Roman Catholic, Barr refers frequently to, and reminds fellow Catholics of, established Catholic

positions. For example, he cites the 1950 *Humani Generis* in which Pope Pius XII affirmed the long-standing Catholic teaching that the theory of evolution is theologically benign, so long as it remains properly a biological theory by not making claims about the human soul. His deference to Catholic doctrine sometimes takes the place of a careful engagement with subjects, such as the challenging issue of divine sovereignty and human responsibility. Similarly, he fails to mention the range of Christian perspectives, such as the nature of the human soul.

Barr's scientifically informed and theologically conservative perspective on randomness is important in chapters 5 and 6, "The Design of Evolution" and "Chance, by Design." The first is a response to Roman Catholic Cardinal Christoph Schönborn's 2005 antievolutionary op-ed in the *New York Times*. Barr points out that the role of randomness in evolution does not, in fact, mean that it is unplanned, uncaused, unguided, or inexplicable, but only uncorrelated, noting that

if the word "random" necessarily entails the idea that some events are "unguided" in the sense of falling "outside of the bounds of divine providence," we should have to condemn as incompatible with Christian faith a great deal of modern physics, chemistry, geology, and astronomy, as well as biology. (p. 49)

He goes on to point out that "the notion of contingency is important in Catholic theology, and it is intimately connected to what in ordinary speech would be called 'chance'" (p. 51). Further, he quotes from *Communion and Stewardship* (an important Catholic document from 2004) that "true contingency in the created order is not incompatible with a purposeful divine providence" (p. 51). Barr thus places the proper function of chance and biological evolution within the realm of God's providence, concluding with "the clear teaching of the Church that no truth of science can contradict the truth of revelation" (p. 53). Barr further observes that the everyday use of the word "random" differs from its use in science. And he further distinguishes, correctly in my view, between "words used by scientists and words used scientifically" (p. 56), given that, for example, there are indeed many scientists who would claim that the randomness found within evolution points to its being unguided.

Barr engages in hard-hitting criticism of young-earth creationism, calling it a "crackpot idea" (p. 29). He also describes what he calls "The End of Intelligent Design" (pp. 69-73) by noting its "claim ... that certain biological phenomena lie outside the ordinary course of nature [is] impossible to substantiate [and

pits] natural theology against science by asserting an incompetence of science" (p. 69). Barr suggests that "the older (and wiser) form of the design argument for the existence of God ... did not point to the naturally inexplicable or to effects outside of the course of nature, but to nature itself and its ordinary operations [which reflect] the power and wisdom of God" (p. 70), citing lengthy passages from the Book of Wisdom (c. 100 BC) and the Letter of Clement (c. AD 97).

As a unified collection of pieces published by a believing scientist over a sixteen-year period, this book is a useful resource, and I commend his sometimes provocative thoughts to readers of *PSCF*. I would have found the book more valuable, though, if it had contained sustained engagements with the responses which some of his pieces have garnered over the years.

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BIOLOGICAL INDIVIDUALITY: Integrating Scientific, Philosophical, and Historical Perspectives by Scott Lidgard and Lynn K. Nyhart, eds. Chicago, IL: The University of Chicago Press, 2017. 361 pages. Paperback; \$25.00. ISBN: 9780226446455.

The field of biology is a very broad discipline. Etymologically, biology (*bios* + *logos*) means the study of life. But what is it that biology actually studies? Life itself is not a concrete, physical thing; rather, it is a function of living things. The focus of biology is not only the study of life as a function of certain things, but also the nature of living things that display the function of life. How does life as a function of certain things actually come about? Put another way, how do certain things come to display life activity or function? Central to these questions is that of biological individuality. What are biological individuals? What are the boundaries of and for biological individuals? These types of questions have been at the center of biological study, research, and thinking for several centuries.

In this edited volume, Lidgard and Nyhart provide a valuable service in pulling together various analyses of biological individuality. Three foci are distinguished in such an investigation: (1) the fundamental philosophical questions of biological individuality; (2) the historical analysis of how biologists have thought about individuality; and (3) how their reflections have influenced not only their research programs, but also how research programs, in turn, influenced philosophical perspectives on biological individuality and the nature of living things. Edited

volumes sometimes suffer from a lack of coordination and a basic central theme, but the editors have dealt with that by providing an integrating introductory chapter, "Introduction: Working Together on Individuality," as well as an integrating philosophical analysis in a concluding chapter, "Philosophical Dimensions of Individuality," by Alan C. Love and Ingo Brigandt. The volume includes thirteen contributors spanning the spectrum of historians, philosophers, biologists, and sociologists.

The editors emphasize that although the concept of individuality is an important concept for biologists, there is no consensus on a definition of biological individuality. They even provide an extensive table (pp. 19–21) outlining the various definitional criteria for biological individuality as well as a graph (p. 23) indicating the year(s) of publications reflecting those definitional criteria and thereby providing a historical perspective.

There are a number of themes that arise in the consideration of biological individuality. One important theme is the evolutionary transitions in individuality (ETI). One such key ETI is that from unicellularity to multicellularity. The case study of the volvocine algae illustrates an attempt to understand this transition. This group of algae provides diverse examples of single-cell forms as well as colonial forms. In some forms, daughter colonies begin to form within the parent colony, raising the question of what constitutes an individual. Are the daughter colonies individuals only after they break from the colonies? In the transition from a unicellular form to a multicellular colonial form, what is the role of cell-to-cell communication and how many different forms of cell-to-cell connections and communications are there? Are such forms of communication fundamental features of the evolutionary transition from unicellularity to multicellularity? In some cases, the daughter colonies are actually clones of the parent colony so that we now have the introduction of levels of organization: one-celled organisms, colonies, and clones, potentially constituting three hierarchical levels. The matter of clones raises the intriguing question of whether all members of a clone, such as a cluster of beech trees sprouting from a single individual beech tree, actually constitute an individual. However, the concept of ETI might also be stretched in questionable ways as evidenced in the chapter by Andrew Reynolds, "Discovering the Ties That Bind: Cell-Cell Communication and the Development of Cell Sociology." Is the use of the term cell sociology a misapplication of the concept of sociology in order to provide some basis for the evolution of animal and human sociology?