

Book Reviews

Although *American Genesis* takes a clear stand against antievolutionism in all of its various forms, the book is also critical of secular scholars who use the debate to attack religion itself and of northerners who stereotyped the South during the Scopes trial. Moran also acknowledges that some engineers and scholars in the field of science and technology studies have rejected, or at least challenged, Darwin's ideas, thus refuting the common perception that all antievolutionists have substituted religion for legitimate scientific inquiry.

Overall, this is a profoundly even-handed book that seeks to explain a historical movement without merely attacking it or falling into the false equivalency trap of giving it equal footing with science. There are, however, some questions that remain unanswered. The book's short length and clear prose make it accessible to specialists, college students, and the general public, but it also leaves out a large portion of the twentieth century. Moran argues that antievolution activism was largely dormant in the years between the Scopes trial and the 1960s, but one is still left to wonder how events such as the Depression, World War II, and the Cold War affected it. Furthermore, at the same time that the movement regained momentum, ideas about race, gender, regionalism, and morality were being challenged through the Civil Rights Movement, feminism, the counterculture, the white southern shift to the Republican Party, and other major events. It would have been appropriate to ask if these historical moments affected antievolutionism, given that in Moran's argument, comparable events in earlier times clearly did.

Similarly, his discussion of the last twenty years is not as well contextualized as other chapters; the reader is left to wonder about the effect of the massive cultural changes of the 1990s and 2000s. Finally, the discussion of black Christianity focuses on Baptist and Methodist churches, but more could be said about the role of Pentecostalism, which was rapidly growing during that time. It rejected modernity even more fervently than other black churches, and was often disparaged by black scholars as the worst kind of superstition and cultish anti-intellectualism. These, however, are relatively minor concerns about an excellent book that sheds new light on the history of America's response to evolution, on common misconceptions about the issue, and on the segmented nature of American society itself.

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ORIGINS & COSMOLOGY

EVOLUTION AND BELIEF: Confessions of a Religious Paleontologist by Robert J. Asher. New York: Cambridge University Press, 2012. xxiii + 300 pages. Hardcover; \$24.99. ISBN: 9780521193832.

In *Evolution and Belief: Confessions of a Religious Paleontologist*, University of Cambridge paleontologist Robert Asher argues that evolution by natural selection is the major driving force that explains the diversification and interrelatedness of all life on Earth, while also contending that a proper understanding of evolution does not rule out the potential for a deity existing behind the natural process. Based on the title of the book, a reader might expect to find equal parts scientific discussion and theological exposition, with a healthy dose of integration between the two, but for the most part, the author does not venture very far from his scientific areas of expertise.

Asher is a respected paleontologist known for his research on the evolution of mammals, including work on endemic African groups and the reconstruction of interrelationships among mammals, using both fossil and molecular data. His expertise is clearly on display throughout the book, as he spends the vast majority of it making a case for the validity of evolution by natural selection. It is here that he is most successful. He discusses how evolutionary biology, while possessing a significant historical component, nonetheless operates on principles observable in the world today and is subject to testing just like any other branch of science. The theory of evolution by natural selection generates innumerable hypotheses that can be potentially falsified by observations from the natural world, and over several chapters, Asher illustrates specific predictions and observations involving character distributions in living organisms, the fossil record, development, and molecular biology.

This section of the book is outstanding, particularly the chapters with a paleontological focus. Topics include the evolutionary origin of mammalian middle ear bones from reptilian jaw bones, the mosaic accumulation of diagnostic features in the early relatives of modern elephants, the ever-growing fossil record documenting the transition made by early cetaceans (whales, dolphins, and porpoises) as they adapted to aquatic life from terrestrial ancestry, the use of DNA sequences to reconstruct the phylogenetic relationships of living organisms, and how the study of developmental pathways can provide insights into the evolution of biological complexity via natural selection. These examples (and others not mentioned here) are dis-

cussed in a manner that is scientifically accurate and thorough, yet still largely accessible to a nonscientist, and many cases are supplemented with helpful illustrations and photos. In addition, Asher makes a concerted effort to provide readers with the means to verify the claims he makes. The text is meticulously annotated with frequent endnotes and copious citations to the literature (including a bibliography of over 470 books and journal articles) for readers who wish to consult the original source material. He even provides step-by-step instructions for how to access DNA sequences using online repositories of such data and how to analyze it using open-source software. Throughout these chapters, Asher's enthusiasm for studying evolution and paleontology is abundantly clear.

However, for all that this book has to offer in terms of well-explained examples of compelling evidence for evolution and common descent, it lacks what I suspect many readers may have been hoping for—a novel, thought-provoking integration of a religious worldview with an evolutionary understanding of life on earth. Asher actually devotes comparatively little space in this book to discussing religious belief, and the “confessions” he makes therein are basically limited to the fact that he is religious and to the idea that he does not see any inherent contradiction between his work as a paleontologist and his belief in God. Throughout the book, Asher repeatedly argues this latter point by discussing the difference between *cause* and *agency*, which are often conflated with one another. He uses several different conceits to illustrate this, one of which involves Thomas Edison. An understanding of just how the filament in a light bulb emits photons has nothing to do with the existence of Edison (its inventor). Likewise, understanding *how* biological change occurs via evolution by natural selection (cause) says nothing about the potential *who* or *why* behind it (agency). Thus, evolution cannot rule out belief in God.

Asher makes it clear, however, that, at least for him, science and rationality do rule out belief in some things that are typically associated with orthodox Christianity. Asher was raised in a Presbyterian church in western New York by a Jewish father and a Christian mother. Currently, he often attends Anglican services in Cambridge, and because he still believes in God, he considers himself religious, going so far as to call himself a Christian. But even Asher admits that much of what he believes “disqualifies [him] as a theistic Christian by most evangelical standards” (p. 25). For example, he considers miracles (when defined as the temporary suspension of natural laws by a supernatural entity) to be irrational, including the virgin birth of Christ. He writes, “Everything that I understand about human biology indicates that [Jesus], too,

had a biological father” (p. 25). He clearly contrasts himself with other religious scientists in this regard, quoting Francis Collins as an example of someone who holds that God can occasionally act in the natural world in ways that appear miraculous. Asher regards such beliefs as superstitious and calls them “incompatible with evolutionary biology or any other rational, data-oriented science” (p. 20). However, he sees his religious beliefs as compatible with evolution because he does not “base [his] religious faith on peculiar human myths about some extraterrestrial spirit breaking the laws of nature” (p. 26). Despite all of this, based on reasoning that he admits is nonscientific, Asher deems Christ and his father to be “inspired individuals” and Christianity to be “a legitimate account of the agency behind life” (p. 25).

I appreciate Asher's frankness in discussing some of his specific beliefs even though some key topics, such as Christ's resurrection, are notably absent, but I think they might make it more difficult for him to make his case for the compatibility of evolution and Christianity—at least for some readers. In the prologue, Asher writes that he hopes he can convince both Christian and atheistic skeptics that his belief in God and his work as a paleontologist are fully compatible. Christians who are opposed to evolution will undoubtedly use his particular beliefs about miracles and Christ as examples of how belief in evolution simply erodes away one's faith, while philosophical naturalists are unlikely to be convinced by a belief in God that, as Asher admits, is based on his own intuition and not on any scientific evidence. For those who already agree with Asher that evolutionary science and Christian faith are compatible in principle, they first must address the fact that Asher's particular religious faith might be very different from their own and that different aspects of his case for compatibility might be problematic for many Christians, including those who are open to evolutionary scenarios.

I think one could easily make the case that Asher presents more of a deistic perspective than a theistic or Christian point of view, but I hope that this will not prevent Christians who disagree with some of his personal beliefs from reading this book. Despite the fact that it offers relatively little in the way of how to integrate an evolutionary perspective of God's creation with an orthodox Christian worldview, *Evolution and Belief* does many things well. For readers interested in where evidence for evolution comes from, Asher's cases are impeccable and clearly written. For those seeking insights into philosophical aspects of evolution, his discussions of cause, agency, contingency, and the limits and nature of science provide a good deal of food for thought.

Book Reviews

Finally, Asher reminds us that as humans, we have the unique and awe-inspiring privilege of studying and understanding the intricacies of the world around us. He concludes the book by noting, “This fact brings me to my knees every time” (p. 231). I cannot help but enthusiastically concur with this sentiment.

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CREATING LIFE IN THE LAB: How New Discoveries in Synthetic Biology Make a Case for the Creator by Fazale Rana. Grand Rapids, MI: Baker Books, 2011. 235 pages. Paperback; \$17.99. ISBN: 9780801072093.

How did life begin? This book uses research efforts in synthetic biology to address this question and to support an intelligent design perspective on biological origins. A reader looking for detailed, current scientific examples to support an intelligent design argument will appreciate this book as an addition to the collection of books supporting this perspective. Readers who are unconvinced by intelligent design arguments will likely remain unconvinced after reading this book.

Rana begins his exploration of the question of life’s origin by looking at the creation of artificial life forms, which he characterizes as a top-down approach. He presents the work of Craig Venter’s research group as exemplifying this approach. Venter’s group is attempting to define the minimal genome using a knock-out scheme, systematically eliminating all genes that are unnecessary for life from *Mycoplasma genitalium*. As Rana describes this work, he is very intentional about emphasizing the complexity of this simple cell. Then, in extraordinary detail, Rana lays out the biochemical steps necessary to add genes back to this minimal genome to create an artificial life form. The biochemical detail forms the basis for illustrating that the creation or transformation of life is an astonishingly arduous task—one that he argues cannot be accomplished without intelligence and design. By extension, he continues, original life could not have come into existence without similar intelligence and design. In this section, Rana weaves an irreducible complexity argument. He suggests that the biochemical and genetic complexity of *Mycoplasma genitalium* is of such intricacy that undirected processes could not give rise to even this simplest of life forms.

A bottom-up approach, described in the second section of this book, also asks how life began. Exemplified by Jack Szostak’s work, a bottom-up approach starts with the raw materials for life and builds complexity. Szostak’s group is attempting to form protocells by designing membrane-bound vesicles and working to

incorporate nucleic acids and other metabolic components into these vesicles. Additionally, Szostak’s group is working on artificial and reengineered enzymes. Other research groups are exploring methods of making the building blocks for RNA molecules and assembling them under prebiotic conditions. Rana also describes how experimental systems that attempt to mimic the geochemical reality of early Earth have been used in efforts to produce prebiotic materials. Rana provides current scientific details and offers scientific critiques of many of the bottom-up experimental approaches. Because scientists cannot go back in time and know with certainty the geochemical conditions of prebiotic Earth, he questions the relevance of the experiments. He expresses concern about energy sources and the presence of oxygen on Earth when life emerged. An irreducible complexity argument is raised in a brief discussion of restriction modification systems. Throughout his presentation of bottom-up experimental systems, he intentionally points out how carefully each experiment was designed by trained, intelligent scientists. Predictably, Rana concludes that these experimental systems point to an intelligent designer. He argues that the bottom-up experiments were as carefully designed by extensively trained and extraordinarily gifted scientists as were the top-down experimental systems. Then, he extrapolates from the necessity of intelligent scientists designing these bottom-up experiments to the necessity of an intelligent designer in the origin of life.

Rana writes as a knowledgeable, enthusiastic, and optimistic supporter of science. He argues throughout his book that advances in science, even advances in synthetic biology, can lead to outcomes that are beneficial for humanity. The science presented in this book is accurate and detailed. Readers looking for evidence to support intelligent design will find detail at a level sure to please. Nonscientist readers and scientists whose discipline is not biochemistry should find this book accessible; an appendix is provided for those who need a refresher course in basic biochemistry.

Quotes from Mary Shelley’s *Frankenstein* begin each chapter and, along with pointed questions that emerge as he discusses various aspects of synthetic biology research, Rana touches on the important ethical issue of boundaries in science. These questions are often posed with an ominous tone that seems inconsistent with his general undertone of enthusiasm and optimism for scientific advances. I would have liked to have seen Rana explore this question in greater depth, but perhaps that is a project for another book. He also sets up an unnecessary creation vs. evolution dichotomy throughout this book that I wish he had avoided.