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he seemed to pose no religious threat and could be employed to respond to the rationalism of Descartes as well as Spinoza's attack on the authority and trustworthiness of scripture.

These last concerns are echoed in the contribution by Rienk Vermij, "Defining the Supernatural: The Dutch Newtonians, the Bible and the Laws of Nature" (chapter 7). Vermij argues that the Dutch fascination with Newton (in his various guises) was occasioned by a complex social and intellectual context (1) to find an answer to the confessional strife of the seventeenth century, (2) to respond to and find an alternative to Cartesian philosophy, and (3) to deliver a decisive blow to Spinoza. It was a search for "social and religious peace" in which some form of harmonization would hold. But "in the end the issue that mattered most was the authority of the Bible. Purely philosophical problems were secondary" (p. 186). Was there a way of understanding the relation between God and nature which gave reassuring answers to both scientific and religious demands?

A complex "cocktail of ideas" and practices are adduced by Vermij: (1) invoking universal gravitation (nonmechanical forces) meant mechanical principles could not explain everything (a direct appeal to Newton's 2nd edition of the *Principia* and particularly Roger Cotes's preface to this edition); (2) an argument from design and the rise of physico-theology; (3) a long tradition of experimental philosophy which challenged Cartesian speculation and Spinoza's thorough geometrical way of reasoning; and (4) an element of theological voluntarism. Newtonian natural philosophy seemed to offer a way to maintain an active divine presence which encouraged a search for "a definition of laws of nature which left room for divine miracles" (p. 191). To deny the reality of miracles implied a denial of the biblical narrative and an undermining of all religion. But in the search for this definition, they, as well as many moderns, face a paradox: the supernatural was defined, delimited, circumscribed by what people deemed to be natural, explainable, nonmiraculous, and scientific.

This book is one for readers with a keen historical interest. Reading it carefully, along with the extensive research that supports the theses advanced, will make one more aware of how theories function in complex social, intellectual, and ecclesiastical contexts. Historical echoes of this eighteenth-century struggle are all around us today in our deliberations about evolution, miracles, and natural law.

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EXPLORING FAITH AND REASON: The Reconciliation of Christianity and Biological Evolution by Bruce Glass. Houston, TX: DBG Publishing, 2012. 296 pages. Paperback; \$13.25. ISBN: 0578110474.

I had high hopes when I began Bruce Glass's book, *Exploring Faith and Reason: The Reconciliation of Christianity and Biological Evolution*. Part 1, entitled "Christianity and Evolution," lives up to the title. Here, Glass skillfully defends a belief in a personal God and the divinity of Jesus in light of the evidence for evolution. Parts 2 and 3, "The Theory of Evolution" and "The Evidence of Evolution," comprise over half the book and give a broad overview of the overwhelming evidence supporting evolutionary theory. Although Glass claims to have written a book for people of all views, the majority of the book speaks to Christians who are unfamiliar with evolutionary theory and the evidence supporting it. These sections are probably less interesting to *PSCF* readers, as most will be well versed in this science already. Part 4 goes through the history of "intelligent design" theory and creationism in the United States, and the misuse of Darwinism to defend racist delusions. While these chapters are interesting to those who want to have a fairly comprehensive overview of the important role of Darwinism in our society, they contribute little to the book title's goal of showing that faith and evolution are altogether compatible.

Part 1 discusses how God's providence and transcendent nature are fully compatible with biological evolution. Glass first notes that "Christianity declares that the physical universe is separate and apart from God" (p. 50). God created the universe and is therefore above, not part of creation. Glass quotes Thomas Aquinas who described God as the "first cause" because God created the physical universe from nothing, and that anything within that creation can happen as a result of "secondary causes." This perspective allows for an independently changing natural world with space for biological evolution, evil, and the "free will" to accept or reject God's grace by confessing Jesus as Savior. Glass notes,

Christianity teaches us that the natural world, therefore, is the foundation or the platform from which we must rise and exercise our free will in accepting and obeying the call of Eternal Truth ... He is active in our own lives when we invite him into them. But we know that God is not in direct control of everything that happens in the world ... because such a notion would implicate him as an

accomplice to the evil that we see around us and that we perpetrate. (pp. 67–68)

Glass explains that this idea hinges on the premise that the Bible is not a scientific encyclopaedia but rather a collection of divinely inspired writings in which the character of God and his plan for humankind is revealed. The narrow literal interpretation of the Bible and of the six-day creation story in particular precludes acceptance of natural causes of the living world. Glass talks about the unprecedented literalism in scriptural interpretation, starting with the Reformation and having taken firm roots in certain groups of Christian believers. He argues that more truth can sometimes be gleaned from allegorical interpretations of certain passages in the Bible, and that Jesus himself used many parables to reveal deep truth. He reminds us that we do not need science to confirm our belief in God. Likewise, no scientific discovery can refute the existence of God because the Christian God is incomprehensible and not constrained by creation.

I enjoyed reading this section as it provides a fresh and compelling case for reconciling faith and science. Glass's tone is pleasant. He describes himself as an agnostic and therefore an impartial observer, refraining from cringeworthy rhetoric that one often finds in books on either side of the topic.

In Parts 2 and 3, the author shares the most important cases supporting the theory of evolution and explains the scientific method. While this broad overview is written in concise and generally accessible prose, most chapters are disappointing for several reasons.

First, Glass's attempt to be comprehensive resulted in a long list of various lines of evidence for evolution and natural selection that lacks clarity and depth. An explanation of the imperfect "design" of the human eye covers almost two pages. After reading it a second time, I did not learn much more than that the light-sensitive rods of the retina are located behind the nerves and blood vessels, which is imperfect from an engineering standpoint. I found myself wishing that more explanation was given as to what evolutionary steps led to this imperfect design.

Second, the cover of the book shows the DNA helix, which refers to one of the most important revolutions in the history of science—the advent of molecular biology and its rapid progress in recent years. Glass chose to be light on genetics and molecular biology, though he does give a list of genetic evidence in his chapter entitled "Tree of Life." A figure would have been helpful to explain some of these difficult but very

compelling cases (similar to the way Francis Collins illustrates the relationships between very different vertebrates based on chromosome anatomy and genome structure in his excellent book, *The Language of God*). This is a missed opportunity because molecular evidence for evolution and the signatures of our evolutionary past in our genomes is absolutely stunning, but it requires more explanation to appreciate its significance.

Third, the book is flawed with respect to several important biological concepts. For example, genetic recombination does not occur only when germ cells fuse and parental chromosomes combine, but also during meiosis by chromosomal crossover. Also, Glass discusses Darwin's book *Pangenesis* in which Darwin reintroduces the old Lamarckian idea of the inheritance of acquired characteristics. He goes on to describe it as Darwin's "great blunder" (p. 107). Although Darwin was indeed wrong about the precise mechanism of inheritance and his theory was highly speculative, some of Darwin's pangenesis principles do relate to heritable aspects of phenotypic plasticity. It has been known for a long time, and recently more widely accepted, that characteristics acquired during life, resulting from environmental or social stressors, can be transferred to the next generation without necessarily altering the DNA code but by the way genes are activated. This so-called epigenetic transgenerational inheritance adds an entirely new dimension to understanding evolutionary change, and perhaps Glass chose to ignore it to make his case more concise.

Throughout the book, Glass accumulates a lot of evidence supporting evolutionary theory, which is not difficult because there are "Clues All Around," as the title of chapter 7 says. He refrained from laying out some weaknesses of the theory that are often overlooked by the majority of scientists. The enormous complexity at many levels of biological organization, ranging from complex cellular processes to the working of the human mind, is truly amazing. Showing evidence that this was formed by spontaneous events and the forces of evolution—and the evidence is indeed overwhelming—is not the same thing as explaining exactly how such a complex structure or cellular process evolved. In other words, we have evidence that all life shares the same origin. We also know how genes and characteristics change at the molecular level, but we cannot revisit our evolutionary past. While Glass refers to this issue, I found myself wishing he had taken a stronger stance against the arrogance with which the evidence is often presented—as if scientists have or will have all the answers to life's problems and questions.

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Finally, evolutionary theory can only illustrate how life changed and diversified over time. It cannot explain how life came into existence. While Glass acknowledges this, I would have preferred a more explicit statement that we do not know how self-replicating entities evolved from nothing. I am always surprised to hear that most people think that science has all the answers, in spite of introductory biology textbooks being very clear about this. More generally, I am not proposing that we imply divine action in this or that area where scientific understanding is currently lacking ("God of the gaps" approach), nor am I negating the evidence for evolution. I think Glass could have presented a more balanced case, clearly pointing to areas where science does not have all the answers to date.

In Part 4, "The Politics of Evolution," Glass covers a brief history of creationism and the ID movements. The last chapter entitled "Darwinism" talks about the misuse of Darwinian theory. Herbert Spencer coined the phrase "survival of the fittest" and took it to the next level by claiming that the poor were unfit and inferior. Darwin's half-cousin Francis Galton came up with eugenics. His idea was supported by many prominent people including Winston Churchill, Theodore Roosevelt, and Adolf Hitler. Glass notes that "Today, thankfully, such ideas are seen as horribly immoral" (p. 266). This part of the book is an interesting read and places Darwinism in a more historical perspective.

Glass's compelling case for evolution's compatibility with Christianity in Part 1 of the book is an enjoyable read. The remainder of the book is a fairly comprehensive introduction to evolutionary biology; it might be of benefit to those who are unfamiliar with evolutionary theory and the evidence that supports it but not as compelling as other books on evolution. However, the fact that the evidence is presented by an impartial observer makes it suitable to readers of all viewpoints.

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BIOLOGICAL INFORMATION: New Perspectives by Robert J. Marks II, Michael J. Behe, William A. Dembski, Bruce L. Gordon, and John C. Sanford, eds. Hackensack, NJ: World Scientific Publishing, 2013. 584 pages. Hardcover; \$178.00. ISBN: 9789814508711.

This volume contains the proceedings of a symposium held May 31, 2011, through June 3, 2011, at Cornell University. Since the famous 1967 Wistar Symposium on "Mathematical Challenges to the Neo-Darwinian

Interpretation of Evolution," the mathematical and biological challenges posed to the modern evolutionary synthesis (neo-Darwinism) have not been resolved. As far as I know, this symposium is the first to address these challenges, incorporating the intelligent design perspective as a possible *scientific* approach. All contributors are active researchers from reputable institutions who question the conventional perspective of neo-Darwinism that natural selection accompanied by mutations is capable of generating new information in the biosphere.

Section One: Information Theory and Biology

The first authors define biological information theoretically as what enables the narrowing down from prior uncertainty to later certainty. Using human language as an analogy, Oller suggests biological information has to be generated and comprehended by intelligence. Random mutation and natural selection lead to pruning of pre-existing content. Basener applies mathematical dynamic modeling analysis to evolution based on an extinction of human civilization and in vitro Q β replicase experiments. They predict that either evolution runs its course to the equilibrium or the system will continue to repeat some state infinitely often. As a result, no new information is generated.

Ewert, Dembski, and Marks II examine the computer program Tierra that simulates the creation of artificial life with evolution. It is characterized by an initial period of high activity producing a number of novel adaptations followed by barren stasis. New functional instructions are generated but these are dwarfed by the size of other changes. Long-term evolutionary progress is dependent on the generation of new information as exemplified in the Cambrian Explosion, which is not explainable by the Tierra model.

Montañez, Marks II, Fernandez, and Sanford demonstrate that DNA in higher genomes is often optimal and poly-functional with nucleotides being used in overlapping genes. Thus, using analyses of the balance between beneficial versus deleterious mutations and the multidimensional analogy with crossword puzzles, beneficial mutations necessary for directional evolution are extremely rare. Sewell addresses the thermodynamic improbability of an open earthly system amenable to evolution from molecule to human. While this may be an argument of the improbability of building order, the need for capturing sunlight energy into usable biological energy is the crucial challenge to abiogenesis. McIntosh contrasts bottom up, materialist, emergence models with top down, nonmaterial, constrained models. He aptly identifies the weakness of the former models as the need