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theory, but rather taking something more akin to a comparative religions approach. The book is a collection of previously published papers along with new material curated into eight chapters, each with its own abstract and notes section. This arrangement, along with chapter subheadings, aids the reader in following along with Northcott's exploration of the Gaia theory. Northcott draws from a variety of published sources, along with his diverse experiences in Borneo, to get his main points across regarding the dangers of scientism in contrast to the restorative powers of Gaia.

Scientism, the condition in which only knowledge gained from observations is considered true, is an ideology that has created, according to Northcott, a "bifurcation between nature and culture." Northcott provides a history of scientism describing how, following the European enlightenment, anything that was not measurable tended to be viewed with suspicion by many in the West. He elaborates that scientific reductionism led to a top-down approach where the "rights of corporate agents trump the rights of people and species to stable and safe habitats" (p. 157). Northcott uses the example of the global response to the COVID-19 pandemic to demonstrate the full potential of scientism and its globalist and technocratic top-down control. Here, Northcott's one-sided argument regarding the benefits of ivermectin, the ineffectiveness of vaccines, the dangers of lockdowns, and the evils of the United Nations may distract readers from his intent of describing top-down control.

In contrast to scientism and its top-down control, Northcott recommends a Gaian approach to addressing the ecological crisis. While *God and Gaia* is not an introductory textbook, it does provide a thorough overview of the theory and its history. With an understanding of the Gaia theory in place, Northcott focuses on connections between Gaia and Hindu, Taoist, and Christian religious traditions. For Northcott, the Gaia theory can be interpreted as a rediscovery of beliefs held by earlier faith traditions. With great respect, he demonstrates how the Vedic Trinity and the Tao have parallels with Gaia theory's emphasis on the agency of all organisms. Northcott then eloquently demonstrates that medieval Christianity also emphasized the sense of agency in all organisms. Northcott, drawing on philosophers such as Seyyed

Hossein Nasr, explains that most western Christians are unaware of the sacred cosmology of their tradition and its emphasis on the agency of being. For the betterment of the planet, Northcott urges religious traditions "to make more prominent in their liturgies the symbiotic relations between humans and other animals which for most of human history has been central to their mutual flourishing" (p. 261).

Overall, *God and Gaia* does an excellent job of contrasting the current approach of scientism versus the moral and spiritual Gaian philosophy to address the ecological crisis. Northcott is calling for a revival of core aspects of human traditions which modern secular science and philosophy have diminished. This Gaian revival recognizes the agency of all of Earth's systems. Although the Gaian revival and its earth-centered philosophy deviates from a distinctly Christian approach to creation care, readers should find some comfort in this revival as it shows that we are not alone in our efforts to restore the ecological integrity of the Earth.

### Note

<sup>1</sup>See Michael S. Northcott, *The Environment and Christian Ethics* (New York: Cambridge University Press, 1996); \_\_\_\_\_, *A Moral Climate: The Ethics of Global Warming* (London, UK: Darton, Longman and Todd, 2007); and \_\_\_\_\_, *A Political Theology of Climate Change* (Grand Rapids, MI: Eerdmans, 2013).

*Reviewed by Bruce Friesen-Pankratz, Assistant Professor of Environmental Science, Natural and Social Science Department, Providence University College, Otterburne, MB R0A 1G0.*

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**A HISTORY OF BIOLOGY** by Michel Morange. Translated by Teresa Lavender Fagan and Joseph Muise. Princeton, NJ: Princeton University Press, 2021. 418 pages. Hardcover; \$29.95. ISBN: 9780691175409.

A book that introduces the history of biology will be of interest to many readers of this journal. The Preface states that the author, Michel Morange, will present a broad historical overview of the history of biology that, unlike some other histories of biology, will include developments in the twentieth and twenty-first centuries. In this regard, he mentions Lois N. Magner, *A History of the Life Sciences*, 3rd ed. (New York: Marcel Dekker, 2002). Magner's book does cover many scientists and developments in the twentieth century, although, significantly, she does not discuss the modern evolutionary synthesis.

Morange states that he will present a “history which leans on the present to look at the past.” That is, he will use “the past to shed light on the present, not to justify it” (p. xvii). To do this, the author uses a novel approach. Each chapter is subdivided into three sections: The Facts; Historical Overview; and Contemporary Relevance. “The Facts” is the first main section of each chapter; in the subsequent two, he reflects on some of the investigators and their discoveries. As he does so, he is not reticent to give his own evaluations and ideas; this is a strength of the book. Thus, he states that the book will not be a simple listing of facts and persons. For example, in the first chapter Morange suggests that the “hunt for pioneers” (for example, ancient thinkers who used the word “atom”) is futile because the ancient idea had little to do with the development of the modern concept. Excursions such as these can be topics for fruitful classroom discussions.

Five succinct chapters take the reader from ancient Greece and Rome, through the Middle Ages, the Renaissance, the seventeenth century, and the Enlightenment. Chapter 1, in which Aristotle is designated as “the father of biology” (p. 2), offers some welcome thoughts on experimentation and the atomists. The discussion of the Middle Ages includes the suggestion that in the history of a science there may be long periods in which there is little growth in scientific knowledge. The chapter on the Age of Enlightenment, the eighteenth century, examines the history of the classification of organisms and the reproduction of animals. An introduction to the subjects related to reproduction, such as the importance of eggs versus sperm, preformation versus epigenesis, parthenogenesis, and spontaneous generation, would have made this topic more accessible.

Two chapters cover the history of biology in the nineteenth century. The author agrees with the idea that Theodor Schwann and Matthias Schleiden deserve much credit for the emergence of cell theory, but he mentions that some others, notably J. E. Purkinje, also deserve credit for this discovery. Under the heading *The Rise of Germ Theory*, the author describes many investigations that led to the understanding of infectious agents. Pride of place—and the (French) author may surely be forgiven for this—goes to Louis Pasteur and the diverse aspects of his work. This chapter offers a comprehensive

description of the three important French post-revolutionary biologists: Jean-Baptiste Lamarck, Georges Cuvier, and Geoffroy Saint-Hilaire. A good account of Charles Darwin’s theory of natural selection is followed by a description of the reception of this work in Great Britain, America, Germany, and France; in many cases, the theory was altered by the influence of other concepts (e.g., Lamarckism). Once the work by Gregor Mendel on the inheritance of characteristics in peas was rediscovered in 1900, “genetics” was rapidly established in Britain and the United States; it was established more slowly in Germany and France.

The prominence of Naturphilosophie in Germany and surrounding countries is described. Morange makes an excellent connection between his discussion of reproduction and the topic of Naturphilosophie by referring to the work of Caspar Friedrich Wolff, a biologist who was an early adherent of this way of thinking. Morange describes the origins of Naturphilosophie, and the influence of ideas in biology. Many German scientists were influenced by this philosophical school; it was a stimulus in the formulation of cell theory. Erik Nordenskiöld shows that Johannes Peter Müller progressed from speculative ideas about biology to making important contributions in many areas of biology. He supervised many graduate students who became important biologists.

The last three chapters, which address developments in the twentieth and the twenty-first centuries, are not only valuable for the historical descriptions, but also as a survey of biology as it is practiced today. The first chapter describes the emergence of biochemistry, immunology, microbiology, and our understanding of the nature and treatment of cancer. The “rediscovery of Mendel’s laws and the rise of genetics” (p. 256) and the “rise of molecular biology” (p. 264) receive the extensive attention one would expect. Morange is clearly in his element here; biologists of all stripes will benefit from reading this chapter.

The chapter that follows describes the development of population genetics. This leads, aptly, into the topic of the modern evolutionary synthesis—the extended evolutionary synthesis is not mentioned. This is followed by an excellent summary of the various topics within ecology. Morange then describes the origins

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and methods of ethology; he includes the contributions of the three 1973 Nobel Prize winners: Karl von Frisch, Konrad Lorenz, and Nikolaas Tinbergen. The burgeoning field of behavioral ecology, related to the last two topics, is not addressed. In the reflective part of the chapter, the author comments, among other topics, on holism and emergentism, global warming, and the responsibility of biologists.

In the final chapter, Morange takes us on a tour of the developments that start with the science described in the previous two chapters and end in the present century. "Structural biology" (p. 331) is advancing our knowledge of nucleic acids and proteins. The relationship between the modern evolutionary synthesis and molecular biology leads to topics such as evolutionary developmental biology ("evo-devo"), epigenetics, and human genome sequencing. The contributions to human genome sequencing of Craig Venter are acknowledged, but the work of Francis Collins at the National Human Genome Research Institute is not. In the last pages of this chapter, and in the Conclusion section of the book, Morange gives numerous opinions on the topics he has covered.

Biologists will enjoy reading this book for the many insights and opinions it presents. They will appreciate reading about the history of their discipline from a French point of view. The English translation of this French book reads well; however, the footnotes and references need to be more suitable for the English-language readership. The footnotes, especially those intended to provide links to further reading, often refer to French-language books or journal articles; it would not be difficult to find many English language equivalents. Some of the French books listed as references are available in English translations. In the Preface, the author states that readers "should consider this book a first version, which their critical input will help improve" (p. xx). One would hope that the author and Princeton University Press will address this last critical comment about the book, for the book has the potential of being a valuable textbook for students.

*Reviewed by Harry Cook, Professor of Biology, Emeritus, The King's University, Edmonton, AB T6B 2H3.*

## GEOLOGY

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**READINGS ON EVOLUTION AND THE NATURE OF SCIENCE: One Christian's Perspective** by Keith B. Miller. Morgantown, PA: Mastof Press, 2022. 224 pages. Paperback; \$20.00. ISBN: 9781601268129.

Keith B. Miller has dedicated his career to conducting paleontological and geological research and teaching at a public university. In addition to his many contributions to the geoscience literature and his activity in professional societies, he has contributed multiple provocative articles that advanced faith and science dialogue, many in *Perspectives on Science and Christian Faith*. *Readings on Evolution and the Nature of Science: One Christian's Perspective* is a collection of sixteen of Miller's articles published between 1993 and 2018 and one previously unpublished manuscript. The articles are clustered among five sections that represent the foci of Miller's writing and public address.

In The Nature of Science section, Miller addresses misunderstandings of science held by the public. He describes how misconceptions have been promoted by traditional young earth creationists and intelligent design advocates who have great contemporary influence on churches, seminaries, local school boards, and state legislatures. In footnotes to the first article, "The Similarity of Theory Testing in the Historical and 'Hard' Sciences," Miller reveals that the integrity of historical science (such as geology and paleontology) was debated in the development of Kansas science education standards. Drawing from the philosophy of science and using examples from geology, he defends historical science as not different from "hard" science in its predictive and explanatory power.

While evolution is the volume's overarching theme, in the second article Miller examines science's nature as applied to the public debate over anthropogenic global warming. He recognizes widely held misconceptions of science that fuel the rejection of controversial theories such as climate change and evolution. These include misunderstandings of fact and theory and the misconception that "unproven" theories should not become the basis for public action. To demonstrate the importance of scale and context in theory making, Miller presents actual data sets