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Book Review

Astrobiology as a Cultural Phenomenon: *The Science of Astrobiology: A Personal View on Learning to Read the Book of Life* by Julian Chela-Flores

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The Science of Astrobiology: A Personal View on Learning to Read the Book of Life, by Julian Chela-Flores, Springer, Dordrecht, 2011, 336 pp, ISBN: 978-94-007-1626-1.

Doctor Chela-Flores's new book *The Science of Astrobiology: A Personal View on Learning to Read the Book of Life* is part of the series Cellular Origin, Life in Extreme Habitats and Astrobiology, published by Springer. Dr. Chela-Flores follows in the steps of seminal predecessors in the field of the origin of life. He aims at merging scientific approach with philosophy and encyclopedic comprehensiveness of the subject.

While reading this book, the origin-of-life professional will recognize its useful organization and summary of various components of astrobiology. To the uninitiated, this volume is an excellent review of the fundamental questions and achievements from the past and present of astrobiology. The main message (which pervades the text), is that human society sees astrobiology as being a branch of science but also a social phenomenon. Dr. Chela-Flores is restless in emphasizing how astrobiology-related thinking is embedded in the interests of modern humankind.

The author is the typical example of consummate teacher and born scientist but also longs to be a philosopher. In this latest of his remarkable list of published books, Dr. Chela-Flores has amassed his lifelong experience into a blend between a textbook, a scientific encyclopedia, and a philosophical tome. Separated into 16 chapters with an epilogue, the story is narrated with urgency, almost as if extraterrestrial life is ready to be discovered should we put more effort into it and ask the right question. In the eyes of the author, the science of astrobiology is by excellence interdisciplinary and requires the help of philosophy to solve basic questions of the origin, evolution, distribution, and destiny of life in the universe (p 17, Section I.4, end of paragraph 1). Chapters 13 and 14 are the best in conveying this message. Chapter 6, on page 119 ("The evolution of intelligent behavior"), is unnecessary and, in my opinion, distracts the reader from the main message. Astrobiology is indeed about the origin and evolution of life, and it is interdisciplinary. Yet this does not mean that the purpose of astrobiology should extend across everything, from the origin of inanimate networks to the origin of intelligence. Admittedly, programs such as SETI search for evidence of extraterrestrial intelligence, but searching for evidence of intelligent information and modern technology is not the same as explaining how intelligence evolved or how humans learned to communicate through means such as language and music (see p 128).

In line with the general trend of modern scientific thinking, Julian Chela-Flores sees prebiotic evolution as being driven by natural selection. One important subject that I find was insufficiently emphasized in this volume (see p 113) is that prebiotic evolution did not occur entirely by Darwinian adaptive evolution but had elements of physical determinism. This implies that in order for life to have originated without divine intervention, the evolution of prebiotic networks must have occurred in a specific direction controlled by the laws of our universe. Succinctly, Darwinian evolution was preceded by simpler evolutionary mechanisms, possibly a form of molecular Lamarkism. Also insufficiently recognized are the great strides humans made in the last 20 years in simulating the organization of prebiotic networks by using computer-based simulations. The personal considerations of the author, such as describing the Bible as an archive of ethics, and numerous encyclopedia-like details, take the reader aback and (in my opinion) are not necessary. For example, the historical facts that "Charles Darwin's first publisher was John Murray" or "Cyril Ponnamperuma was the first secretary of ISSOL" or "during his career Sydney Fox has published papers with over 60 associates" will make the reader wish he or she could identify an abbreviated version of this volume that is more to the point and distilled to its essence.

Strong, and well justified, emphasis is put on the Trieste conferences as the pivotal turntable of theoretical astrobiology. This comes with insufficient acknowledgment of other excellent and seminal conferences in this field. They include, but are not restricted to, Gordon conferences on the origin of life, AbSciCon, the Definition of Life Conference (Paris), the Northern Astrobiology Conference (Stockholm), Bioastronomy (Puerto Rico), and many other ISSOL, IAU, and artificial life meetings. In all fairness, if one group of conferences was given so much attention (*i.e.*, the Trieste meetings), then a larger section of the book should have been dedicated to the other conferences and their contribution to the science of astrobiology.

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Overall, I found this book instructive and mind-opening. The main lesson the reader will learn from reading this book is to be humble in the face of the interdisciplinarity of astrobiology. The author is very successful in conveying that much can be gained in astrobiology by merging science with philosophy. Ultimately, we are left with the desire to see how future volumes from this Springer series will exploit this avenue emphasized by Dr. Julian Chela-Flores.

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