

## BOOK REVIEW

*Between Necessity and Probability: Searching for the Definition and Origin of Life.*  
edited by Radu Popa, Springer, 2004, 252 pp, 58 figures b/w.

Radu Popa is one of the rare scientists who attempt to see the big picture, and this book is the result. Popa brings an unusual background to his writing. He has investigated sealed cave ecosystems in Romania, and spent post-doctoral years in the astrobiology program at the Jet Propulsion Laboratory in Pasadena. He also brings a sense of European scholarship to his writing, and a remarkable breadth of interests.

Some of the flavor of this book is imparted by a quote from Marcus Aurelius on the first page: “Everything we hear is an opinion, not the fact. Everything we see is a perspective, not the truth.” I take this as a caveat from the author, that readers should maintain a certain level of appropriate skepticism as we follow his discussion of ideas regarding the origin of life.

To give a sense of the book’s contents, it is worth listing the chapter titles:

The early history of bioenergy.

Origin of cell boundaries and metabolism.

Origin of specificity. The order, complexity and diversity of life.

The origin of handedness.

The early history of bio-information.

The purpose-like nature of life.

Assembling the early puzzle of life.

The material-independent signatures of life. Forensic tools of astrobiology.

Appendix A. Models and theories of life.

Appendix B. Chronology of definitions and interpretations of life.

Appendix C. Dictionary.

The titles immediately suggest that the author brings his own approach to the question of life’s origin. This is not a light-hearted treatise. Instead, the book is a balanced, succinct and scholarly effort growing out of the author’s experience in exobiology and astrobiology. For the most part it is objective in tone, although occasionally the author appears, as in Chapter 7 on “The purpose-like nature of life.” The author is even-handed, covering without prejudice most of the main concepts that have been put forward to explain the origin of life. Part of the value of the book is that virtually everyone will discover publications and concepts they did not know about. The author has clearly done his homework.

Although the author discusses the contributions of many predecessors in the field, there are also some genuinely novel concepts expressed in the book. Some of these are philosophical, such as the chapter entitled “The purpose-like nature of life.” Others suggest new experimental approaches. The main text is followed by a series of appendices which also contain useful information. For instance, the author cites 572 papers ranging from 1855 to 2002, with 40 total cited in 2002 alone. Ten models and theories of life are summarized in Appendix A, and a glossary/dictionary helps the uninitiated to understand the peculiar scientific dialect that has emerged in the study of life’s beginnings.

I am pleased to recommend Popa’s book to colleagues who are interested in the question of how to define life, and the process by which life emerged on the sterile surface of the early Earth, nearly 4 billion years ago.

DAVID DEAMER  
*University of California, Santa Cruz*