

THE QUEST FOR A UNIVERSAL THEORY OF LIFE

Searching for Life As We Don't Know It

Integrating both scientific and philosophical perspectives, this book provides an informed analysis of the challenges of formulating a universal theory of life. Among the issues discussed are crucial differences between definitions and scientific theories and, in the context of examples from the history of science, how successful general theories develop. The central problem discussed is two-fold: First, our understanding of life is still tacitly wedded to an antiquated Aristotelian framework for biology; second, there are compelling reasons for considering that familiar Earth life, which descends from a last universal common ancestor, is unrepresentative. What is needed are examples of life as we don't know it. Potential sources are evaluated, including artificial life, extraterrestrial life, and a shadow biosphere right here on Earth. A novel strategy for searching for unfamiliar life in the absence of a definition or general theory is developed. This book is a valuable resource for graduate students and researchers studying the nature, origins, and extent of life in the universe.

CAROL E. CLELAND is Professor of Philosophy at the University of Colorado, Boulder, USA, where she is also Director of the Center for the Study of Origins and a Co-Investigator at the Center for Astrobiology. She teaches advanced interdisciplinary courses in the philosophy of science, including graduate seminars on central issues in astrobiology. She publishes papers in major science and philosophy journals, and is co-editor of the anthology *The Nature of Life* (Cambridge University Press, 2010).

“An essential read for anyone interested in the nature of life and its origins. Cleland’s philosophical outlook means that she approaches the subject from a fresh perspective, framing important questions rarely discussed by scientists . . . and deliberating points in a provocative way that forces readers to examine some of their cherished beliefs that they thought were self-evident.”

*Athel Cornish-Bowden,
French National Center for Scientific Research, Marseilles, France*

“What is life? What universal principles apply to any biosphere? Our efforts to answer these deep questions are stymied because of our biased, Earth-bound perspective with only one kind of (known) life. In a book rich with original ideas and lucid insights, science philosopher Carol Cleland considers life from the perspective of what we *don’t* know – the limitations, hidden biases, sloppy definitions, and false assumptions that may lead us astray. From ‘shadow biospheres’ on Earth, to artificial life in the lab, to alien lifeforms in distant galaxies, Cleland expands our minds and leads us to rethink what we thought we knew.”

*Robert Hazen,
Carnegie Institution for Science, Washington, USA*

“Searching for life elsewhere in our solar system or beyond is at the forefront of science today due to recent discoveries about terrestrial life, planetary environments, and planets around other stars. We can’t extrapolate from our single example of life on Earth, which all share common biochemistry and are descended from a common ancestor, as to what the characteristics of life elsewhere in the universe might be. Given these uncertainties, how can we identify something as alive? What does it mean to be living? What is life? Carol Cleland takes a philosophy of science approach to what constitutes life, integrating it with biology in a planetary context. She has made a valuable contribution to our understanding of the nature of life and how to search for it, both on Earth and elsewhere.”

*Bruce Jakosky,
University of Colorado, Boulder, USA*

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THE QUEST FOR A UNIVERSAL THEORY OF LIFE

Searching for Life As We Don't Know It

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For Leta and Elspeth

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