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Origins of Life **The Origins of Life** *The Origins of Life* **Origins of Life** Origins of Life **The Origin of Life on the Earth Young Sun, Early Earth and the Origins of Life** Origins of Life in the Universe *The Evolutionary Origins of Life and Death* **The Molecular Origins of Life** *The Origin and Nature of Life on Earth* Origins of Life The Origins of Life on the Earth **Origins and Evolution of Life** Origins of Life **Origin of Life Origins of Life The Origins of Life and the Universe Astronomical Origins of Life** Origins **The Vital Question: Energy, Evolution, and the Origins of Complex Life** Origins of Life: The Primal Self-Organization The Emergence of Life **Cosmochemical Evolution and the Origins of Life The Chemistry of Life's Origins** The Origins of Life Prebiotic Chemistry and the Origin of Life *The Origins of Life* **Origins of Life Origins of Life A New History of Life** *Origins* **The Origin and Early Evolution of Life: Prebiotic Chemistry of Biomolecules The Vital Question Understanding Origins** The Origins of Life Molecular Biology of the Cell The Chemistry of Life's Origins **The Origin of Life Cosmochemical Evolution and the Origins of Life**

How did life on earth originate? Did replication or metabolism come first in the history of life? In this book, Freeman Dyson examines these questions and discusses the two main theories that try to explain how naturally occurring chemicals could organize themselves into living creatures. The majority view is that life began with replicating molecules, the precursors of modern genes. The minority belief is that random populations of molecules evolved metabolic activities before exact replication existed. Dyson analyzes both of these theories with reference to recent important discoveries by geologists and chemists. His main aim is to stimulate experiments that could help to decide which theory is correct. This second edition covers the enormous advances that have been made in biology and geology in the past and the impact they have had on our ideas about how life began. It is a clearly-written, fascinating book that will appeal to anyone interested in the origins of life. This classic of biochemistry offered the first detailed exposition of the theory that living tissue was preceded upon Earth by a long and gradual evolution of nitrogen and carbon compounds. "Easily the most scholarly authority on the question...it will be a landmark for discussion for a long time to come." — New York Times. Why is life the way it is? Bacteria evolved into complex life just once in four billion years of life on earth - and all complex life shares many strange properties, from sex to ageing and death. If life evolved on other planets, would it be the same or completely different?In The Vital Question, Nick Lane radically reframes evolutionary history, putting forward a cogent solution to conundrums that have troubled scientists for decades. The answer, he argues, lies in energy: how all life on Earth lives off a voltage with the strength of a bolt of lightning. In unravelling these scientific enigmas, making sense of life's quirks, Lane's explanation provides a solution to life's vital questions: why are we as we are, and why are we here at all? This is ground-breaking science in an accessible form, in the tradition of Charles Darwin's The Origin of Species, Richard Dawkins' The Selfish Gene, and Jared Diamond's Guns, Germs and Steel. Explores the many different myths, theories, and experiments which explain the origin of life, including spontaneous generation, the development of planets, chemical evolution of matter, and the various places in the solar system where life exists or may exist. Life appears ungraspable, yet its understanding lies at the heart of current preoccupations. In our attempt to understand life through its origins, the ambition of the present collection is to unravel the network of the origin of the various spheres of sense that carry it onwards. The primogenital matrix of generation (Tymieniecka), elaborated as the fulcrum of this collection, elucidates the main riddles of the scientific / philosophical controversies concerning the status of various spheres that seek to make sense of life. This publication, in two volumes, includes most of the scientific papers presented at the first meeting of the International Society for the Study of the Origin of Life (ISSOL), held on June 25-28, 1973 in Barcelona, Spain. The first volume contains the invited articles and the second volume the contributed papers, which also appear in the 1974 and 1975 issues, respectively, of the new journal Origins of Life, published by D. Reidel. A relatively large number of meetings on the subject of the origin of life have been held in different places since 1957. In terms of its organization, scope, and number and nationality of participants, the Conference celebrated last year in Barcelona closely followed the three international conferences held earlier in Moscow, U.S.S.R., 1957, Wakulla Springs, U.S.A., 1963, and Pont-a-Mousson, France, 1970. For this reason the first ISSOL meeting was also named the Ath International Conference on the Origin of Life. Providing a comprehensive account of the environment of the early Earth and descriptions of how the first self-replicating systems emerged from prebiotic chemistry and evolved into primitive cell-like entities, this book is an essential reference for those interested in the origin of life on Earth. "I'll begin with a challenging question: Why should anyone want to know about the origin of life? The answers will vary from one person to the next, but the simplest answer is curiosity. Anyone reading this introduction is curious because they wonder how life could have begun on the Earth, but there is more to it than that. My friend Stuart Kauffman wrote a book with the title At Home in the Universe. The title refers to a deep sense of satisfaction that comes when we begin to understand how our lives on Earth are connected to the rest of the universe. There are surprises and revelations as we discover those connections"-- This 199 book reviews discoveries in astronomy, paleontology, biology and chemistry to help us to understand the likely origin of life on Earth. The most fascinating questions on the history of the Universe are answered in this text. This publication, in two volumes, includes most of the scientific papers presented at the first meeting of the International Society for the Study of the Origin of Life (ISSOL), held on June 25-28, 1973 in Barcelona, Spain. The first volume contains the invited articles and the second volume the contributed papers, which also appear in the 1974 and 1975 issues, respectively, of the new journal Origins of Life, published by D. Reidel. A relatively large number of meetings on the subject of the origin of life have been held in different places since 1957. In terms of its organization, scope, and number and nationality of participants, the Conference celebrated last year in Barcelona closely followed the three international conferences held earlier in Moscow, U.S.S.R., 1957, Wakulla Springs, U.S.A., 1963, and Pont-a-Mousson, France, 1970. For this reason the first ISSOL meeting was also named the Ath International Conference on the Origin of Life. In this fascinating book, John Maynard Smith and Eors Szathmary present an original picture of evolution. They propose that during evolution there have been a number of major transitions in the way in which information is passed between generations. These transitions include the appearance ofthe first replicating molecules, the emergence of co-operative animal societies, and the unique language ability of humans. Containing many new ideas, this book is contemporary biology on the grandest scale, from the birth of life to the origin of language. Origin of the Universe. -- Formation of the Elements. -- Beginnings of Chemistry. -- Element Abundances of the Planets. -- Geologic, Hydrologic, and Atmospheric Evolution of the Earth. -- Cells, Organelles, and Biomolecules. -- Metabolic Strategies and Pathway Design. -- Biochemical Catalysis. -- Storage, Replication, and Utilization of Biochemical Information. -- General Considerations Concerning the Origin of Life on the Earth. -- Biochemical Pathways Involving Carbohydrates. -- Prebiotic Pathways Involving Carbohydrates. -- Similarities Between the Biosynthesis of Nucleotides and the Prebiotic Synthesis of Nucleotides. -- RNA Metabolism and the Prebiotic Synthesis of RNA. Amino Acid Synthesis Now and Then. -- Chemistry of Translation. -- Early Developments in Polypeptide Synthesis. -- Lipid Metabolism and the Prebiotic Synthesis of Lipids. -- Properties of Membranes and Their Evolution. -- Possible Roles of Clays and Minerals in the Origin of Life. -- Evolution of Organisms. -- Evol ... In this book forty eminent scientists examine the astrobiological origins of life and the emergence of biodiversity in extreme environments. The coverage includes extremophiles: microbes living in hostile conditions of high temperature, psychrophilic, UV radiation, and halophilic environments. Also discussed are the origin and history of Martian water, and the possible biogeochemistry inside Titan. The Origins of Life and the Universe is the culmination of a university science professor's search for understanding and is based on his experiences teaching the fundamental issues of physics, chemistry, and biology in the classroom. What is life? Where did it come from? How can understanding the origins of life on Earth help us understand the origins of the universe, and vice versa? These are questions that have occupied us all. This is a book, then, about the beginning of things—of the universe, matter, stars, and planetary systems, and finally, of life itself—topics of profound interest that are rarely considered together. After surveying prescientific accounts of the origins of life, the book examines the concepts of modern physics and cosmology, in particular the two pillars of modern physics, relativity and quantum theory, and how they can be applied to the Big Bang model of the creation of the universe. The author then considers molecular genetics and DNA, the famed building block of life. In addition to assessing various hypotheses concerning the appearance of the first bacterial cells and their evolution into more complex eukaryotic cells,

this section explains how "protocells" may have started a kind of integrated metabolism and how horizontal gene transfer may have speeded up evolution. Finally, the book discusses the possibility that life did not originate on planet Earth but first appeared on other solar planets, or perhaps in other star systems. How would such a possibility affect our understanding of the meaning of life, or of its ultimate fate in the universe? The book ends as it begins, with profound questions and penetrating answers, a state-of-the-art guide to unlocking the scientific mysteries of life and matter. This volume contains the lectures presented at the second course of the International School of Space Chemistry held in Erice (Sicily) from October 20 - 30 1991 at the "E. Majorana Centre for Scientific Culture". The course was attended by 58 participants from 13 countries. The Chemistry of Life's Origins is well recognized as one of the most critical subjects of modem chemistry. Much progress has been made since the amazingly perceptive contributions by Oparin some 70 years ago when he first outlined a possible series of steps starting from simple molecules to basic building blocks and ultimate assembly into simple organisms capable of replicating, catalysis and evolution to higher organisms. The pioneering experiments of Stanley Miller demonstrated already forty years ago how easy it could have been to form the amino acids which are critical to living organisms. However we have since learned and are still learning a great deal more about the primitive conditions on earth which has led us to a rethinking of where and how the condition for prebiotic chemical processes occurred. We have also learned a great deal more about the molecular basis for life. For instance, the existence of DNA was just discovered forty years ago. - How did the Sun come into existence? - How was the Earth formed? - How long has Earth been the way it is now, with its combination of oceans and continents? - How do you define “life”? - How did the first life forms emerge? - What conditions made it possible for living things to evolve? All these questions are answered in this colourful textbook addressing undergraduate students in "Origins of Life" courses and the scientifically interested public. The authors take the reader on an amazing voyage through time, beginning five thousand million years ago in a cloud of interstellar dust and ending five hundred million years ago, when the living world that we see today was finally formed. A chapter on exoplanets provides an overview of the search for planets outside the solar system, especially for habitable ones. The appendix closes the book with a glossary, a bibliography of further readings and a summary of the Origins of the Earth and life in fourteen boxes. Origin of the Universe. -- Formation of the Elements. -- Beginnings of Chemistry. -- Element Abundances of the Planets. -- Geologic, Hydrologic, and Atmospheric Evolution of the Earth. -- Cells, Organelles, and Biomolecules. -- Metabolic Strategies and Pathway Design. -- Biochemical Catalysis. -- Storage, Replication, and Utilization of Biochemical Information. -- General Considerations Concerning the Origin of Life on the Earth. -- Biochemical Pathways Involving Carbohydrates. -- Prebiotic Pathways Involving Carbohydrates. -- Similarities Between the Biosynthesis of Nucleotides and the Prebiotic Synthesis of Nucleotides. -- RNA Metabolism and the Prebiotic Synthesis of RNA. Amino Acid Synthesis Now and Then. -- Chemistry of Translation. -- Early Developments in Polypeptide Synthesis. -- Lipid Metabolism and the Prebiotic Synthesis of Lipids. -- Properties of Membranes and Their Evolution. -- Possible Roles of Clays and Minerals in the Origin of Life. -- Evolution of Organisms. -- Evol ... Uniting the foundations of physics and biology, this groundbreaking multidisciplinary and integrative book explores life as a planetary process. Origins of Life: A Cosmic Perspective presents an overview of the concepts, methods, and theories of astrobiology and origins of life research while presenting a summary of the latest findings. The book provides insight into the environments and processes that gave birth to life on our planet, which naturally informs our assessment of the probability that has arisen (or will arise) elsewhere. In addition, the book encourages readers to go beyond basic concepts, to explore topics in greater depth, and to engage in lively discussions. The text is intended to be suitable for mid- and upper-level undergraduates and beginning graduate students and more generally as an introduction and overview for researchers and general readers seeking to follow current developments in this interdisciplinary field. Readers are assumed to have a basic grounding in the relevant sciences, but prior specialized knowledge is not required. Each chapter concludes with a list of questions and discussion topics as well as suggestions for further reading. Some questions can be answered with reference to material in the text, but others require further reading and some have no known answers. The intention is to encourage readers to go beyond basic concepts, to explore topics in greater depth, and, in a classroom setting, to engage in lively discussions with class members. The question of why an individual would actively kill itself has long been an evolutionary mystery. Pierre M. Durand’s ambitious book answers this question through close inspection of life and death in the earliest cellular life. As Durand shows us, cell death is a fascinating lens through which to examine the interconnectedness, in evolutionary terms, of life and death. It is a truism to note that one does not exist without the other, but just how does this play out in evolutionary history? These two processes have been studied from philosophical, theoretical, experimental, and genomic angles, but no one has yet integrated the information from these various disciplines. In this work, Durand synthesizes cellular studies of life and death looking at the origin of life and the evolutionary significance of programmed cellular death. The exciting and unexpected outcome of Durand’s analysis is the realization that life and death exhibit features of coevolution. The evolution of more complex cellular life depended on the coadaptation between traits that promote life and those that promote death. In an ironic twist, it becomes clear that, in many circumstances, programmed cell death is essential for sustaining life. Living material contains about twenty different sorts of atom combined into a set of relatively simple molecules. Astrobiologists tend to believe that abiotic mater ial will give rise to life in any place where these molecules exist in appreciable abundances and where physical conditions approximate to those occurring here on Earth. We think this popular view is wrong, for it is not the existence of the building blocks of life that is crucial but the exceedingly complicated structures in which they are arranged in living forms. The probability of arriving at biologically significant arrangements is so very small that only by calling on the resources of the whole universe does there seem to be any possibility of life originating, a conclusion that requires life on the Earth to be a minute component of a universal system. Some think that the hugely improbable transition from non-living to living mat ter can be achieved by dividing the transition into many small steps, calling on a so-called 'evolutionary' process to bridge the small steps one by one. This claim turns on semantic arguments which seek to replace the probability for the whole chain by the sum of the individual probabilities of the many steps, instead of by their product. This is an error well known to those bookies who are accustomed to taking bets on the stacking of horse races. But we did not begin our investigation from this point of view. The Origin of Life on the Earth covers the proceedings of the First International Symposium of The Origin of Life on the Earth, held at Moscow on August 19-24, 1957. This symposium brings together numerous scientific studies on the evolutionary principles and the different stages in the evolutionary development of matter. This book is organized into seven parts encompassing 60 chapters. The first parts discuss evidence that on the formation of hydrocarbons and their derivatives on the surface of the Earth even before the emergence of life. The subsequent parts are devoted to the many asymmetrical syntheses under the influence of circularly-polarized ultraviolet light, by catalytic reactions occurring on the surface of quartz crystals, and spontaneously by slow crystallization from solutions. These topics are followed by reviews on the possible means of abiogenic formation of amino acids, porphyrins, protein-like polymers, polynucleotides and other high-molecular organic compounds. Considerable chapters explore the complete possibility of the primary formation of these compounds on the surface of the Earth even before life was present on it. Other general topics covered include nucleic acids, nucleoproteins and viruses. The last part considers general biochemical problems connected with the further development of metabolism. This book will be of value to astronomers, physicists, geologists, chemists, and biologists. Life appears ungraspable, yet its understanding lies at the heart of current preoccupations. In our attempt to understand life through its origins, the ambition of the present collection is to unravel the network of the origin of the various spheres of sense that carry it onwards. The primogenital matrix of generation (Tymieniecka), elaborated as the fulcrum of this collection, elucidates the main riddles of the scientific / philosophical controversies concerning the status of various spheres that seek to make sense of life. Imagine primordial Earth, a churning cauldron of liquefied rock. Steaming, seething -- a vast desolate wasteland, inhospitable to life. Yet somehow first life appeared. Maybe chemicals in a primordial soup spontaneously spawned a single-celled creature that continued to evolve. Or perhaps a transcendent Creator formed and nurtured the initial life forms. To determine what really happened requires a framework to evaluate the evidence. For the first time in print, Dr. Rana and Dr. Ross present a scientific model for the creation of first life on Earth -- a model based on the Bible. They present testable predictions for this life-origins scenario and for the competing naturalistic scenarios. Which model withstands the rigorous scrutiny of science and the tests of time? The one that does gives insight to a deeper question: Why would the first life forms precede human life by billions of years? Book jacket. This volume contains the lectures presented at the second course of the International School of Space Chemistry held in Erice (Sicily) from October 20 - 30 1991 at the "E. Majorana Centre for Scientific Culture". The course was attended by 58 participants from 13 countries. The Chemistry of Life's Origins is well recognized as one of the most critical subjects of modem chemistry. Much progress has been made since the amazingly perceptive contributions by Oparin some 70 years ago when he first outlined a possible series of steps starting from simple molecules to basic building blocks and ultimate assembly into simple organisms capable of replicating, catalysis and evolution to higher organisms. The pioneering experiments of Stanley Miller demonstrated already forty years ago how easy it could have been to form the amino acids which are critical to living organisms. However we have since learned and are still learning a great deal more about the primitive conditions on earth which has led us to a rethinking of where and how the condition for prebiotic chemical processes occurred. We have also learned a great deal more about the molecular basis for life. For instance, the existence of DNA was just discovered forty years ago. Studying the origin of life is one of man’s greatest achievements over the last sixty years. The fields of interest encompassed by this quest are multiple and

interdisciplinary: chemistry, physics, biology, biochemistry, mathematics, geology but also statistics, atmospheric science, meteorology, oceanography, and astrophysics. Recent scientific discoveries, such as water on Mars and the existence of super-Earths with atmospheres similar to primordial Earth, have pushed researchers to simulate prebiotic conditions in explaining the abiotic formation of molecules essential to life. This collection of articles offers an overview of recent discoveries in the field of prebiotic chemistry of biomolecules, their formation and selection, and the evolution of complex chemical systems. Devoted to exploring questions about the origin and evolution of life in our Universe, this highly interdisciplinary book brings together a broad array of scientists. Thirty chapters assembled in eight major sections convey the knowledge accumulated and the richness of the debates generated by this challenging theme. The text explores the latest research on the conditions and processes that led to the emergence of life on Earth and, by extension, perhaps on other planetary bodies. Diverse sources of knowledge are integrated, from astronomical and geophysical data, to the role of water, the origin of minimal life properties and the oldest traces of biological activity on our planet. This text will not only appeal to graduate students but to the large body of scientists interested in the challenges presented by the origin of life, its evolution, and its possible existence beyond Earth. The primary purpose of this book is to prepare the ground for coordinated efforts aiming to answer the question: where and when life originated. The appearance of life involves three successive stages: i) the formation of chemical elements and their combination to simple molecules, which is the concern of physicists; ii) the evolution of organized complexity in biomolecules and their reactions, which falls within the field of chemistry; iii) the onset of Darwinian evolution after the appearance of the first cell-like structure, which is studied by biologists. This book focuses on the first two steps of this process with chapters exploring topics such as chemical element abundances; galaxies, galactic magnetic fields and cosmic rays; galactic chemical evolution. Key Features: Contains extensive lists of reference and additional reading. Includes new hypotheses concerning the origin of life. Combines consideration from nuclear physics, astrophysics, astro- and geochemistry. Despite its interdisciplinary nature, this book remains accessible to nonexperts, and would be a valuable companion for both experts and laypeople. “One of the deepest, most illuminating books about the history of life to have been published in recent years.” —The Economist The Earth teems with life: in its oceans, forests, skies and cities. Yet there’s a black hole at the heart of biology. We do not know why complex life is the way it is, or, for that matter, how life first began. In The Vital Question, award-winning author and biochemist Nick Lane radically reframes evolutionary history, putting forward a solution to conundrums that have puzzled generations of scientists. For two and a half billion years, from the very origins of life, single-celled organisms such as bacteria evolved without changing their basic form. Then, on just one occasion in four billion years, they made the jump to complexity. All complex life, from mushrooms to man, shares puzzling features, such as sex, which are unknown in bacteria. How and why did this radical transformation happen? The answer, Lane argues, lies in energy: all life on Earth lives off a voltage with the strength of a lightning bolt. Building on the pillars of evolutionary theory, Lane’s hypothesis draws on cutting-edge research into the link between energy and cell biology, in order to deliver a compelling account of evolution from the very origins of life to the emergence of multicellular organisms, while offering deep insights into our own lives and deaths. Both rigorous and enchanting, The Vital Question provides a solution to life’s vital question: why are we as we are, and indeed, why are we here at all? If theoretical physicists can seriously entertain canonical “standard models” even for the big-bang generation of the entire universe, why cannot life scientists reach a consensus on how life has emerged and settled on this planet? Scientists are hindered by conceptual gaps between bottom-up inferences (from early Earth geological conditions) and top-down extrapolations (from modern life forms to common ancestral states). This book challenges several widely held assumptions and argues for alternative approaches instead. Primal syntheses (literally or figuratively speaking) are called for in at least five major areas. (1) The first RNA-like molecules may have been selected by solar light as being exceptionally photostable. (2) Photosynthetically active minerals and reduced phosphorus compounds could have efficiently coupled the persistent natural energy flows to the primordial metabolism. (3) Stochastic, uncoded peptides may have kick-started an ever-tightening co-evolution of proteins and nucleic acids. (4) The living fossils from the primeval RNA World thrive within modern cells. (5) From the inherently complex protocellular associations preceding the consolidation of integral genomes, eukaryotic cell organization may have evolved more naturally than simple prokaryote-like life forms. – If this book can motivate dedicated researchers to further explore the alternative mechanisms presented, it will have served its purpose well. The history of life on Earth is, in some form or another, known to us all--or so we think. A New History of Life offers a provocative new account, based on the latest scientific research, of how life on our planet evolved--the first major new synthesis for general readers in two decades. Charles Darwin's theories, first published more than 150 years ago, form the backbone of how we understand the history of the Earth. In reality, the currently accepted history of life on Earth is so flawed, so out of date, that it's past time we need a 'New History of Life.' In their latest book, Joe Kirschvink and Peter Ward will show that many of our most cherished beliefs about the evolution of life are wrong. Gathering and analyzing years of discoveries and research not yet widely known to the public, A New History of Life proposes a different origin of species than the one Darwin proposed, one which includes eight-foot-long centipedes, a frozen “snowball Earth”, and the seeds for life originating on Mars. Drawing on their years of experience in paleontology, biology, chemistry, and astrobiology, experts Ward and Kirschvink paint a picture of the origins life on Earth that are at once too fabulous to imagine and too familiar to dismiss--and looking forward, A New History of Life brilliantly assembles insights from some of the latest scientific research to understand how life on Earth can and might evolve far into the future. How did life on Earth originate? Did replication or metabolism come first in the history of life? In the second edition of the acclaimed Origins of Life, distinguished scientist and science writer Freeman Dyson examines these questions and discusses the two main theories that try to explain how naturally occurring chemicals could organize themselves into living creatures. The majority view is that life began with replicating molecules, the precursors of modern genes. The minority belief is that random populations of molecules evolved metabolic activities before exact replication existed and that natural selection drove the evolution of cells toward greater complexity for a long time without the benefit of genes. Dyson analyzes both of these theories with reference to recent important discoveries by geologists and chemists, aiming to stimulate new experiments that could help decide which theory is correct. This second edition covers the impact revolutionary discoveries such as the existence of ribozymes, enzymes made of RNA; the likelihood that many of the most ancient creatures are thermophilic, living in hot environments; and evidence of life in the most ancient of all terrestrial rocks in Greenland have had on our ideas about how life began. It is a clearly written, fascinating book that will appeal to anyone interested in the origins of life. The origin of life from inanimate matter has been the focus of much research for decades, both experimentally and philosophically. Luisi takes the reader through the consecutive stages from prebiotic chemistry to synthetic biology, uniquely combining both approaches. This book presents a systematic course discussing the successive stages of self-organisation, emergence, self-replication, autopoiesis, synthetic compartments and construction of cellular models, in order to demonstrate the spontaneous increase in complexity from inanimate matter to the first cellular life forms. A chapter is dedicated to each of these steps, using a number of synthetic and biological examples. With end-of-chapter review questions to aid reader comprehension, this book will appeal to graduate students and academics researching the origin of life and related areas such as evolutionary biology, biochemistry, molecular biology, biophysics and natural sciences. The main intention of this book is to bring together contributions from biology, cognitive science, and the humanities for a joint exploration of some of the main contemporary notions dealing with the understanding of origins in life,mind and society. The question of origin is inseparable from a web of hypotheses that both shape and explain us. Although origin invites examination, it always seems to elude our grasp. Notions have always been produced to interpret the genesis of life, mind, and the social order, and these notions have all remained unstable in the face of theoretical and empirical challenges. In any given period, the central ideas on origin have had a mutual resonance frequently overlooked by specialists engaged in theirown particular fields. As a consequence, this book should be of interest to a wide audi ence. In particular, for all those engaged in the social sciences and the philosophy of science, it is unique document, since bridges to the natural sciences in a mutually illuminating way are hard to find. Whether as a primary source or as inspirational reading, we feel this book has a place in every library. The material comes from an international meeting held in September 13-16, 1987 at Stanford University, organized by F. Varela and J.-P. Dupuy at the request of the Program of Interdisciplinary Research of Stanford University. We are grateful to Rene Girard, the Program Director, for making it possible with the help of the Mellon Foundation. This book presents an overview of current views on the origin of life and its earliest evolution. Each chapter describes key processes, environments and transition on the long road from geochemistry and astrochemistry to biochemistry and finally to the ancestors of today ?s organisms. This book combines the bottom-up and the top-down approaches to life including the origin of key chemical and structural features of living cells and the nature of abiotic factors that shaped these features in primordial environments. The book provides an overview of the topic as well as its state of the art for graduate students and newcomers to the field. It also serves as a reference for researchers in origins of life on Earth and beyond.