The Emergence Of Life On Earth A Historical And Scientific Overview

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is there life on other planets how similar is extraterrestrial life to life on earth these questions until recently confined to the pages of science fiction books are now the legitimate subject matter of extensive scientific research recent discoveries of extrasolar planets life under extreme conditions and possible life on other celestial bodies have heightened public interest on the origin of life

genesis and evolutionary development of life discusses the present state of thought on the origin and development of life the book contains six chapters and begins with a brief history of attempts to solve the problem of the origin of life this is followed by separate chapters the discuss the following events the initial stages in the evolution of carbon compounds formation of the primitive soup origin of prebiological systems evolution of protobionts and the origin of the first organisms and the further evolution of the first organisms

this volume explores the historical and current theories about the origin of life addressing in particular the three key puzzles of how and when life began on earth and in what form

uniquely combining biology and philosophy this book offers a systematic course in the emergence of life from inanimate matter through to cellular life with review questions included this book will appeal to graduate students academics and researchers in the field of the origin of life and other related areas

living organisms are astonishingly complex and the more we know about them their biochemistry their anatomy their behaviour the more astonishing are the detailed adaptations that we discover how could this complexity have arisen most of us are familiar with darwin s theory of evolution by natural selection the idea behind it being that in nature those individuals best able to survive and reproduce will transmit the characteristics that enabled them to do so to their offspring leading to the evolution of traits beneficial to the organism although darwin s idea is simple perhaps because it is so simple it is hard to believe that it is able to explain the complexity of the living world we can breed cows that produce more milk compared with earlier generations say but we cannot breed pigs that fly or horses that can talk there would be no promising variants that we could select and breed from where then does the variation come from that has made possible the evolution of ever increasing complexity in the wonderfully adapted organisms we see around us in answering this central question john maynard smith and eors szathmary present for a general readership a novel picture of evolution their basic idea is that evolution depends on changes in the information that is passed between generations and that there have been a number of major transitions in the way that information is stored and transmitted these transitions include the appearance of the first replicating molecules the origin of life itself the origin of cells reproduction by sexual means the appearance of multicellular plants and animals the emergence of cooperation and of animal societies and the unique language ability of humans here then is an accessible account of contemporary biology on the grandest scale from the birth of life to the origin of language containing many original ideas and covering many of the most fundamental ideas in biology this important and deeply interesting book will appeal both to readers with little prior knowledge of science and to biologists themselves

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

an estimated 4 6 billion years ago the earth and moon were formed in a violent impact on this many agree and even more that a long time after that life began however few know that the first life on the earth may not have emerged on this planet but could in fact have begun on mars brought here by meteorites in this revolutionary book leading scientists peter ward and joe kirschvink rewrite the principal account of the history of life on earth they show not only how the rise of animals was delayed for billions of years but also what it was that first forced fish out of the sea and onto the land together the two scientists explain how developments in the environment led to multiple ice ages before the emergence of dinosaurs and other giant animals and what the true cause of these great beasts eventual extinction was finally charting the course of our own evolution they explore whether this generation will see the end of the human species a new history of life proves not only that much of what we think we know should be unlearned but also that the true history of life on earth is much more surprising and wonderful than we could ever have imagined

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short history of attempts to solve the problem of the origin of life beginning stages in the evolution of carbon compounds formation of the primitive soup origin of prebiological systems evolution of protobionts and the origin of the first organisms further evolution of the first organisms

provides historical coverage of the united states and canada from prehistory to the present includes information abstracted from over 2 000 journals published worldwide

it seems likely that scientists will someday discover how life can emerge on habitable planets like the early earth and mars in origin of life what everyone needs to know david w deamer has written a comprehensive guide to the origin of life that is organized in three sections the first section addresses questions such as where do the atoms of life come from how old is earth what was the earth like before life began where does water come from after each question is answered there is a follow up how do we know this expands the horizon of the book explaining how scientists reach conclusions and why we can trust these answers the second section describes how certain organic molecules can spontaneously assemble into populations of protocells that can undergo selection and evolve

toward primitive living systems here deamer proposes a truly novel concept that life did not begin in the ocean but instead in fresh water hot springs on volcanic land masses resembling hawaii today true knowledge is not just what we know but equally important is what we don t yet know in the third section deamer lists the outstanding questions that must be addressed before we can finally answer a fundamental question of biology how can life begin

describes at least three decades of experiments reaching toward his concept on how life may have originated on earth

addressing the emergence of life from a systems biology perspective this new edition has undergone extensive revision reflecting changes in scientific understanding and evolution of thought on the question what is life with an emphasis on the philosophical aspects of science including the epistemic features of modern synthetic biology and also providing an updated view of the autopoiesis cognition theory the book gives an exhaustive treatment of the biophysical properties of vesicles seen as the beginning of the road map to the minimal cell a road map which will develop into the question of whether and to what extent synthetic biology will be capable of making minimal life in the laboratory fully illustrated accessibly written directly challenging the reader with provocative questions offering suggestions for research proposals and including dialogues with contemporary authors such as humberto maturana albert eschenmoser and harold morowitz this is an ideal resource for researchers and students across fields including bioengineering evolutionary biology molecular biology chemistry and chemical engineering

in origins of existence astrophysicist fred adams takes a radically different approach from the long tradition of biologists and spiritual leaders who have tried to explain how the universe supports the development of life he argues that life followed naturally from the laws of physics which were established as the universe burst into existence at the big bang those elegant laws drove the formation of galaxies stars and planets including some like our earth that chain of creation produced all the tiny chemical structures and vast celestial landscapes required for life ultimately physical laws and the complexity they generate define the kind of biospheres that are possible from an amazon rain forest to a frigid ocean beneath an ice sheet on a jovian moon adams suggests that life was not merely some lucky break but rather a natural outcome of the ascending ladder of complexity supported by our universe since our galaxy seems to harbor millions of planets with the same basic elements of habitability as earth the emergence of life is probably not a rare event if life emerges deep inside planets and moons as new research suggests happened on our planet the number of viable habitats is truly enormous seven chronological chapters take the reader from the laws of physics and birth of the universe to the origins of life on earth showing how energy flowed exploded and was repeatedly harnessed in replicating structures and organisms in his groundbreaking first book fred adams established the five eras of the universe with a focus on its long term future it is perhaps not surprising that he now turns his attention to the mystery of our astronomical origins here is a stunning new perspective a book of genesis for our time revealing how the laws of physics created galaxies stars planets and even life in the universe

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