Cradle Of Life The Discovery Of Earths Earliest Fossils

The Enigmatic Realm of **Cradle Of Life The Discovery Of Earths Earliest Fossils**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing lacking extraordinary. Within the captivating pages of **Cradle Of Life The Discovery Of Earths Earliest Fossils** a literary masterpiece penned by way of a renowned author, readers set about a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book is core themes, assess its distinct writing style, and delve into its lasting effect on the hearts and minds of those that partake in its reading experience.

The Story of the Earth in 25 Rocks Donald R. Prothero 2018-01-02 Every rock is a tangible trace of the earth's past. The Story of the Earth in 25 Rocks tells the fascinating stories behind the discoveries that shook the foundations of geology. In twenty-five chapters—each about a particular rock, outcrop, or geologic phenomenon—Donald R. Prothero recounts the scientific detective work that shaped our understanding of geology, from the unearthing of exemplary specimens to tectonic shifts in how we view the inner workings of our planet. Prothero follows in the footsteps of the scientists who asked—and answered—geology's biggest questions: How do we know how old the earth is? What happened to the supercontinent Pangea? How did ocean rocks end up at the top of Mount Everest? What can we learn about our planet from meteorites and moon rocks? He answers these questions through expertly chosen case studies, such as Pliny the Younger's firsthand account of the eruption of Vesuvius; the granite outcrops that led a Scottish scientist to theorize that the landscapes he witnessed were far older than Noah's Flood; the salt and gypsum deposits under the Mediterranean Sea that indicate that it was once a desert; and how trying to date the age of meteorites revealed the dangers of lead poisoning. Each of these breakthroughs filled in a piece of the greater puzzle that is the earth, with scientific discoveries dovetailing with each other to offer an increasingly coherent image of the geologic past. Summarizing a wealth of information in an entertaining, approachable style, The Story of the Earth in 25 Rocks is essential reading for the armchair geologist, the rock hound, and all who are curious about the earth beneath their feet.

Extinctions in the History of Life Paul D. Taylor 2004-11-11 Extinction is the ultimate fate of all biological species - over 99 percent of the species that have ever inhabited the Earth are now extinct. The long fossil record of life provides scientists with crucial information about when species became extinct, which species were most vulnerable to extinction, and what processes may have brought about extinctions in the geological past. Key aspects of extinctions in the history of life are here reviewed by six leading palaeontologists, providing a source text for geology and biology undergraduates as well as more advanced scholars. Topical issues such as the causes of mass extinctions and how animal and plant life has recovered from these cataclysmic events that have shaped biological evolution are dealt with. This helps us to view the biodiversity crisis in a broader context, and shows how large-scale extinctions have had profound and long-lasting effects on the Earth's biosphere.

The Archaean: Geological and Geochemical Windows into the Early Earth Andrew Y. Glikson 2014-08-05 Archaean terrains contain a wealth of structural, stratigraphic, textural, mineralogical, geochemical and isotopic features allowing insights into the nature of the early Earth. This book is based on studies during 1964-2007 of Archaean terrains in Australia and to a lesser extent in South Africa and India, as well as on visits to Archaean terrains in Canada, the US and China, as well as petrological and geochemical studies of igneous and sedimentary rock suites from a range of terrains. The book will include a range of photographic and microscopic images, geological sketch maps and diagrams illustrating the lessons derived from field and the laboratory. Also other Archaean terrains are being reviewed. The book is intended for Earth scientists as well as broader intelligent readership.

Handbook of Astrobiology Vera M. Kolb 2018-12-07 Choice Recommended Title, August 2019 Read an exclusive interview with Professor Vera Kolb here. Astrobiology is the study of the origin, evolution, distribution, and future of life on Earth. This exciting and significant field of research also investigates the potential existence and search for extra-terrestrial life in the Solar System and beyond. This is the first handbook in this burgeoning and interdisciplinary field. Edited by Vera Kolb, a highly respected astrobiologist, this comprehensive resource captures the history and current state of the field. Rich in information and easy to use, it assumes basic knowledge and provides answers to questions from practitioners and specialists in the field, as well as providing key references for further study. Features: Fills an important gap in the market, providing a comprehensive overview of the field Edited by an authority in the subject, with chapters written by experts in the many diverse areas that comprise astrobiology Contains in-depth and broad coverage of an exciting field that will only grow in importance in the decades ahead

Earliest Life on Earth: Habitats, Environments and Methods of Detection Suzanne D. Golding 2010-09-02 This volume integrates the latest findings on earliest life forms, identified and characterised in some of the oldest rocks on Earth. New material from prominent researchers in the field is presented and evaluated in the context of previous work. Emphasis is placed on the integration of analytical methods with observational techniques and experimental simulations. The opening section focuses on submarine hot springs that the majority of researchers postulates served as the cradle of life on Earth. In subsequent sections, evidence for life in strongly metamorphosed rocks such as those in Greenland is evaluated and early ecosystems identified in the well preserved Barberton and Pilbara successions in Southern Africa and Western Australia. The final section includes a number of contributions from authors with alternate perspectives on the evidence and record of early life on Earth. Audience This volume will be valuable to researchers and graduate students in biogeosciences, geochemistry, paleontology and geology interested in the origin of life on earth.

Life's Engines Paul G. Falkowski 2023-06-13 The marvelous microbes that made life on Earth possible and support our very existence For almost four billion years, microbes had the primordial oceans all to themselves. The stewards of Earth, these organisms transformed the chemistry of our planet to make it habitable for plants, animals, and us. Life's Engines takes readers deep into the microscopic world to explore how these marvelous creatures made life on Earth possible—and how human life today would cease to exist without them. Paul Falkowski looks "under the hood" of microbes to find the engines of life, the actual working parts that do the biochemical heavy lifting for every living organism on Earth. With insight and humor, he explains how these miniature engines are built—and how they have been appropriated by and assembled like Lego sets within every creature that walks, swims, or flies. Falkowski shows how evolution works to maintain this core machinery of life, and how we and other animals are veritable conglomerations of microbes. A vibrantly entertaining book about the microbes that support our very existence, Life's Engines will inspire wonder about these elegantly complex nanomachines that have driven life since its origin. It also issues a timely warning about the dangers of tinkering with that machinery to make it more "efficient" at meeting the ever-growing demands of humans in the coming century.

Taphonomy Peter A. Allison 2010-11-03 Taphonomic bias is a pervasive feature of the fossil record. A pressing concern, however, is the extent to which taphonomic processes have varied through the ages. It is one thing to work with a biased data set and quite another to work with a bias that has changed with time. This book includes work from both new and established researchers who are using laboratory, field and data-base techniques to characterise and quantify the temporal and spatial variation in taphonomic bias. It may not provide all the answers but it will at least shed light on the right questions.

Origins Frank H. T. Rhodes 2016-07-28 "Fossils are the fragments from which, piece by laborious piece, the great mosaic of the history of life has been constructed. Here and there, we can supplement these meager scraps by the use of biochemical markers or geochemical signatures that add useful information, but, even with such additional help, our reconstructions and our models of descent are often tentative. For the fossil record is, as we have seen, as biased as it is incomplete. But fragmentary, selective, and biased though it is, the fossil record, with all its imperfections, is still a treasure. Though whole chapters are missing,

many pages lost, and the earliest pages so damaged as to be, as yet, virtually unreadable, this—the greatest biography of all—is one in whose closing pages we find ourselves."—from Origins In Origins, Frank H. T. Rhodes explores the origin and evolution of living things, the changing environments in which they have developed, and the challenges we now face on an increasingly crowded and polluted planet. Rhodes argues that the future well-being of our burgeoning population depends in no small part on our understanding of life's past, its long and slow development, and its intricate interdependencies. Rhodes's accessible and extensively illustrated treatment of the origins narrative describes the nature of the search for prehistoric life, the significance of geologic time, the origin of life, the emergence and spread of flora and fauna, the evolution of primates, and the emergence of modern humans.

Life in the Universe Dirk Schulze-Makuch 2018-11-19 Examines each of these parameters in crucial depth and makes the argument that life forms we would recognize may be more common in our solar system than many assume. Considers exotic forms of life that would not have to rely on carbon as the basic chemical element, solar energy as the main energy source, or water as the primary solvent and the question of detecting bio- and geosignatures of such life forms, ranging from earth environments to deep space. Seeks an operational definition of life and investigate the realm of possibilities that nature offers to realize this very special state of matter. Avoids scientific jargon wherever possible to make this intrinsically interdisciplinary subject understandable to a broad range of readers.

Genesis Jan Sapp 2003 What is evolution? What is a gene? How did these concepts originate and how did they develop? This book is a short history ranging from Lamarck and Darwin to DNA and the Human Genome Project, exploring the conceptual oppositions, techniques, institutional conditions and controversies that have shaped the development of biology.

The Ages of the Earth J. Javier Álvaro 2019-04-12 Negationism is an irrational but useful tool for manipulation. Almost nobody supports the Flat Earth model or the geocentrism, but some European educational laws still offer a confessional education that treats as real the myth about Adam and Eve. This book recounts the struggle that human mind has maintained, over two millennia, against creationist myths. The journey takes place between cosmogonies, theological dogmas, natural philosophy, Deism and the inevitable secularism of the Age of Enlightenment.

A History of Earth's Biota J. William Schopf 2022-08-19 Over the past half-century, studies of the evolution of life have themselves evolved, markedly. Life's earliest history, unknown and thought unknowable for the 100 years following publication of Darwin's great opus in 1859 has finally come to light as the documented fossil record has been extended an astonishing sevenfold, from 500 million to now 3,500 million years. No longer are studies of evolution based solely on ancient fossils, now augmented by the evidence of life's long development encoded in its genetic and biochemical make-up. Indeed, as new knowledge of the history of plants and animals and of their ever-changing environment has been unearthed, understanding of the overriding impact of the sequential co-evolution of the two groups, plants leading the charge with animals following their fodder, has become increasingly acknowledged. Intended for a non-specialist audience, students and laypersons alike, this book presents an up-to-date, well-illustrated encapsulation of the Phanerozoic history of life, the 550-million-year-long advance of plants and animals that set the stage for the rise of humans. The presentation deals with the human side of science, not just the science itself, as it illuminates how scientific discoveries are actually made. It is a wondrous read as it wends its way through a terrifically interesting, remarkable tale, showing that, surprisingly and stunningly, it is true beyond all doubt that from plants to people, bacteria to bats, microbes to man, all life is linked!

Encyclopedia of Time H. James Birx 2009-01-13 Surveying the major facts, concepts, theories, and speculations that infuse our present comprehension of time, the Encyclopedia of Time: Science, Philosophy, Theology, and Culture explores the contributions of scientists, philosophers, theologians, and creative artists from ancient times to the present. By drawing together into one collection ideas from scholars around the globe and in a wide range of disciplines, this Encyclopedia will provide readers with a greater understanding of and appreciation for the elusive phenomenon experienced as time. Features · Surveys historical thought about time, including those that emerged in ancient Greece, early Christianity, the Italian Renaissance, the Age of Enlightenment, and other periods+ Covers the original and lasting insights of evolutionary biologist Charles Darwin, physicist Albert Einstein, philosopher Alfred North Whitehead, and theologian Pierre Teilhard de Chardin + Discusses the significance of time in the writings of Isaac Asimov, Samuel Taylor Coleridge, Fyodor M. Dostoevsky, Francesco Petrarch, and numerous other authors+ Includes the contributions of naturalists, philosophers, physicists, theologians, astronomers, anthropologists, geologists, paleontologists, and psychologists+ Includes artists+ portrayals of the fluidity of time, including painter Salvador Dali+s The Persistence of Memory and The Discovery of America by Christopher Columbus, and writers Gustave Flaubert+s The Temptation of Saint Anthony and Henryk Sienkiewicz+s Quo Vadis+ Provides a truly interdisciplinary approach, with discussions of Aztec, Buddhist, Christian, Egyptian, Ethiopian, Islamic, Hindu, Navajo, and many other cultures+ conceptions of time

Cradle of Life Vincent Carruthers 2019-08-01 The Cradle of Humankind World Heritage Site situated in the heart of the Magaliesberg Biosphere Reserve is the jewel in South Africa's evolutionary crown: an area 'of outstanding universal value', it has attracted world-wide interest and furnished key evidence about where, when and how we came to be. The greater Magaliesberg area is peppered with some 200 caves and has a unique geology, history and biodiversity. For decades now, specialists have been combing the area to uncover evidence of our heritage. In his spectacular new title, Vincent Carruthers guides readers along a timeline, from the birth of our planet through to developments of the twenty first century. Along the way he documents the formation of our landscapes and the emergence of life, the rise of hominins, the stone and iron ages, early settlement, migrations, wars and modern developments in the Magaliesberg – the entire evolution of life up to the present, as we know it. Vividly illustrated with photographs, maps and diagrams, Cradle of Life portrays the intrigue and importance of the site, taking readers on a magical journey of discovery. Sales points: Authoritative handling of a complex topic; lavishly illustrated with colourful photos and diagrams; chronological detailing of key events from the beginning of time up to the modern age; accessible and appealing to a wide range of users, from visitors to students, enthusiasts and academics

Paleobotany Edith L. Taylor 2009-01-21 This book provides up-to-date coverage of fossil plants from Precambrian life to flowering plants, including fungi and algae. It begins with a discussion of geologic time, how organisms are preserved in the rock record, and how organisms are studied and interpreted and takes the student through all the relevant uses and interpretations of fossil plants. With new chapters on additional flowering plant families, paleoecology and the structure of ancient plant communities, fossil plants as proxy records for paleoclimate, new methodologies used in phylogenetic reconstruction and the addition of new fossil plant discoveries since 1993, this book provides the most comprehensive account of the geologic history and evolution of microbes, algae, fungi, and plants through time. * Major revision of a 1993 classic reference * Lavishly illustrated with 1,800 images and user friendly for use by paleobotanists, biologists, geologists and other related scientists * Includes an expanded glossary with an extensive up-to-date bibliography and a comprehensive index * Provides extensive coverage of fungi and other microbes, and major groups of land plants both living and extinct

The New Foundations of Evolution Jan Sapp 2009-07-24 This is the story of a profound revolution in the way biologists explore life's history, understand its evolutionary processes, and reveal its diversity. It is about life's smallest entities, deepest diversity, and greatest cellular biomass: the microbiosphere. Jan Sapp introduces us to a new field of evolutionary biology and a new brand of molecular evolutionists who descend to the foundations of evolution on Earth to explore the origins of the genetic system and the primary life forms from which all others have emerged. In so doing, he examines-from Lamarck to the present-the means of pursuing the evolution of complexity, and of depicting the greatest differences among organisms. The New Foundations of Evolution takes us into a world that classical evolutionists could never have imagined: a deep phylogeny based on three domains of life and multiple kingdoms, and created by mechanisms very unlike those considered by Darwin and his followers. Evolution by leaps seems to occur regularly in the microbial world where molecular evolutionists have shown the inheritance of acquired genes and genomes are major modes of evolutionary innovation. Revisiting the history of microbiology for the first time from the perspective of evolutionary biology, Sapp shows why classical Darwinian conceptions centering on questions of the origin of species were forged without a microbial foundation, why classical microbiologists considered it impossible to know the course of evolution, and classical molecular biologists considered the evolution of the molecular genetic system to be beyond understanding. In telling this

stirring story of scientific iconoclasm, this book elucidates how the new evolutionary biology arose, what methods and assumptions underpin it, and the fiery controversies that continue to shape biologists' understanding of the foundations of evolution today.

Space Weather Jean Lilensten 2007-05-16 This book shows the state-of-the-art in Europe on a very new discipline, Space Weather. This discipline lies at the edge between science and industry. This book reflects such a position with theoretic papers and applicative papers as well. Each chapter starts with a short introduction, which shows the coherence of a given domain. Then, four to five contributions written by the best specialists in Europe give detailed hints of a hot topic in space weather.

The Cradle of Humankind World Heritage Site Anton Swanepoel 2016-03-31 Discover the Site Heralded as the Birthplace of Humankind From the beginning, we have wondered where we come from. In 2015, scientists revealed evidence that shocked the world, and rewrote history books. Did they find the answer in the ancient fossils? Seen by many as the Cradle of Humankind, the caves near Krugersdorp in South Africa have delivered the best evidence for where we came from, and who our ancestors were. However, they also shocked the world when they rewrote the timeline for where we thought our ancestors started to be self-aware, capable of complex thought, used fire, and performed rituals. The discovery is unprecedented, and heralded as the greatest fossil discovery ever made on the African continent and that from a site already famous for being the birthplace of humankind. Discover the Cradle of Humankind World Heritage Site with 47 stunning pictures, some of them of the infamous Sterkfontein and Wonder Caves, as well as the Origins Centre in Johannesburg and the Maropeng Centre at the Cradle. This book will give you a unique perspective on the Cradle of Humankind, and help you plan your visit to this remarkable site. Contained in the text you'll learn the following: A Short history of the Cradle Heritage site, including Sterkfointein and Wonder Cave Descriptions, GPS coordinates, entrance fees and information pertaining to the Maropeng Centre, Sterkfontein Caves, Wonder Cave, Origins Centre, Rhino and Lion Park, and Kromdraai Mining museum 47 pictures of the Maropeng Centre, Sterkfontein Caves, Wonder Cave, Origins Centre, and Rhino and Lion Park The Cradle of Humankind is a site to behold. If you are thinking of visiting South Africa and want to experience the Cradle of Humankind, then this guide book is for you. Get Your copy today

Advances in Applied Microbiology Paul Blum 2001-10-08 Although they comprise one of the three fundamental branches of life, it was only the last decade that Archaea were formally recognized as a group alongside Eukaryotes and Bacteria. Bacteria-like in that they are single celled organisms that lack a nucleus and intracellular organelles, the Arachaea also share a large gene set typical of eukaryotes, for making and repairing DNA, RNA and protein. More surprisingly, they only inhabit environments typical of the extremes of early earth--hot springs, thermal ocean vents, saline lake, or oxygen deficient sediments. A breakpoint on the common evolutionary path, it is evident that the Archaea diverged early in the history of life, establishing their importance in evolutionary sciences. Archaea: Ancient Microbes, Extreme Environments, and the Origin of Life tells this evolving story, furthering our understanding of the microbe commonalities, and providing for evolutionary justification in the use of archaea as mechanistic model systems. Series: Advances in Applied Microbiology, published by Academic Press since 1959, has been, and continues to be, one of the most widely read and authoritative review sources in microbiology. Traditionally, each volume has contained an eclectic mix of review articles on topics of current interest. With, Archaea: Ancient Microbes, Extreme Environments, and the Origin of Life, Advances in Applied Microbiology will enhance this tradition by also including thematic volumes, edited by a Guest Editor, each of which will cover an important area of microbiology in depth. Archaea: Ancient Microbes, Extreme Environments, and the Origin of Life is the first thematic volume for Advances in Applied Microbiology. It covers archaeal evolution, furthering our understanding of the archaeal-eukaryotic commonalities, and providing for evolutionary justification in the use of archaea as model systems in addressing mechanistic questions about eukaryotes. Key Features: * Provides a unique and current summary of common subcellular mechanisms in archaea and eukaryotes * Emphasizes the use of genomics to provide a biological context for understanding archaea * Contrasts evoluttionary studies on the fossil record with those on molecular phylogeny * Includes extensive tables, graphs, images, drawings and other illustrations * Simplifies the interdisciplinary challenge necessary to understand the significance of archaea Audience: Archaea: Ancient Microbes, Extreme Environments, and the Origin of Life book should attract the attention of cell biologists, geneticists, microbiologists, molecular biolgists, bacteriologists, as well as advanced students and researchers in evolutionary studies. About the Author: Paul Blum, PhD, is currently an Associate Professor in the School of Biological Sciences at the University of Nebraska. He conducts research on the molecular genetics, genomics and ecology of hyperthermophilic archaea with the support of the National Science Foundation. He obtained his doctoral degree in microbiology from the University of California-Davis with postdoctoral training at the University of California-Berkely and Stanford Medical School. He is currently on the editorial board of several journals and has authored over 30 research publications and review articles. He is the past recipient of an award from the National Institutes of Environmental Health Sciences as well as past and current recipient of research project awards from the Department of Energy, Water Environment Research Foundation and the National Science Foundation. During his spare time Dr. Blum can be found conducting surveys of the biota in geothermal pools across the continental United States.

The Precambrian Earth P.G. Eriksson 2004-03-04 In this book the editors strive to cover all primary (i.e. non-applied) topics in Precambrian geology in a non-partisan way, by using a large team of international authors to present their datasets and highly divergent viewpoints. The chapters address: celestial origins of Earth and succeeding extraterrestrial impact events; generation of continental crust and the greenstone-granite debate; the interaction of mantle plumes and plate tectonics over Precambrian time; Precambrian volcanism, emphasising komatiite research; evolution and models for Earth's hydrosphere and atmosphere; evolution of life and its influence on Precambrian ocean chemistry and chemical sedimentation; sedimentation through Precambrian time; the application of sequence stratigraphy to the Precambrian rock record. Each topic is introduced and a non-partisan closing commentary provided at the end of each chapter. The final chapter blends the major geological events and rates at which important processes occurred into a synthesis, which postulates a number of "event clusters" in the Precambrian when significant changes occurred in many natural systems and geological environments. Also available in paperback, ISBN: 0-444-51509-7

Early Life Lynn Margulis 2002 Early life attempts to tell the stories of primitive life. The text conveys some of the excitement in the current attempts to reconstruct the opening chapters of life on the planet Earth, long before the appearance of the simplest animal or plant.

From Fossils to Astrobiology Joseph Seckbach 2008-11-07 From Fossils to Astrobiology reviews developments in paleontology and geobiology that relate to the rapidly-developing field of Astrobiology, the study of life in the Universe. Many traditional areas of scientific study, including astronomy, chemistry and planetary science, contribute to Astrobiology, but the study of the record of life on planet Earth is critical in guiding investigations in the rest of the cosmos. In this varied book, expert scientists from 15 countries present peer-reviewed, stimulating reviews of paleontological and astrobiological studies. The overviews of established and emerging techniques for studying modern and ancient microorganisms on Earth and beyond, will be valuable guides to evaluating biosignatures which could be found in the extraterrestrial surface or subsurface within the Solar System and beyond. This volume also provides discussion on the controversial reports of "nanobacteria" in the Martian meteorite ALH84001. It is a unique volume among Astrobiology monographs in focusing on fossil evidence from the geological record and will be valuable to students and researchers alike.

Biogeochemistry Heinrich D. Holland 2005-06-08 The Treatise on Geochemistry is the first work providing a comprehensive, integrated summary of the present state of geochemistry. It deals with all the major subjects in the field, ranging from the chemistry of the solar system to environmental geochemistry. The Treatise on Geochemistry has drawn on the expertise of outstanding scientists throughout the world, creating the reference work in geochemistry for the next decade. Each volume consists of fifteen to twenty-five chapters written by recognized authorities in their fields, and chosen by the Volume Editors in consultation with the Executive Editors. Particular emphasis has been placed on integrating the subject matter of the individual chapters and volumes. Elsevier also offers the Treatise on Geochemistry in electronic format via the online platform ScienceDirect, the most comprehensive database of academic research on the Internet today, enhanced by a suite of sophisticated linking, searching and retrieval tools.

History of Life Richard Cowen 2013-04-25 This text is aimed at students and anyone interested in the history of life on our planet. It explores the 'whys' of events that occurred, and in this newest edition, it takes a closer look at the evolution of the physical earth and the strong interactions between organisms and environment. The book's coverage includes geography, climate, atmosphere, ocean, and land (a changing stage) while following interplay between organisms. Also new to this edition is a dedicated website which explores additional environmental factors and supplemental topics, and provides interactive exercises, a detailed glossary, key links and all art in downloadable form. The art is also available to instructors on CD-ROM in PowerPoint and Jpeg formats. An Instructor manual CD-ROM for this title is available. Please contact our Higher Education team at HigherEducation@wiley.com for more information.

Life's Origin J. William Schopf 2002-10-21 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.

The Spark of Life Christopher Wills 2001 Christopher Wills and Jeffrey Bada examine the enduring mysteries surrounding life's origin: did life arise on Earth or on some other planet? What did the earliest primitive organisms look like? Were they based on RNA, DNA, or on something we would hardly recognize today? The authors examine the latest research - in fields ranging from molecular biology to astronomy - on questions surrounding life's origins. They untangle a century of contentious debate and explore many theories, assessing the probability of everything from asteroids and Martian rocks to 'primordial soup' and volcanic vents. They then present their own elegant and compelling scenario: life arose not in the subterranean depths, as many believe, but on Earth's tumultuous surface, where a primitive form of natural selection spawned the first genetic material, perhaps in the form of a proto-virus. The book ends with a whirlwind tour of one of the most exciting scientific endeavours - the search for extra-terrestial life.

Cradle of Life J. William Schopf 1987 One of the greatest mysteries in reconstructing the history of life on Earth has been the apparent absence of fossils dating back more than 550 million years. We have long known that fossils of sophisticated marine life-forms existed at the dawn of the Cambrian Period, but until recently scientists had found no traces of Precambrian fossils. The quest to find such traces began in earnest in the mid-1960s and culminated in one dramatic moment in 1993 when William Schopf identified fossilized microorganisms three and a half billion years old. This startling find opened up a vast period of time--some eighty-five percent of Earth's history--to new research and new ideas about life's beginnings. In this book, William Schopf, a pioneer of modern paleobiology, tells for the first time the exciting and fascinating story of the origins and earliest evolution of life and how that story has been unearthed. Gracefully blending his personal story of discovery with the basics needed to understand the astonishing science he describes, Schopf has produced an introduction to paleobiology for the interested reader as well as a primer for beginning students in the field. He considers such questions as how did primitive bacteria, pond scum, evolve into the complex life-forms found at the beginning of the Cambrian Period? How do scientists identify ancient microbes and what do these tiny creatures tell us about the environment of the early Earth? (And, in a related chapter, Schopf discusses his role in the controversy that swirls around recent claims of fossils in the famed meteorite from Mars.) Like all great teachers, Schopf teaches the non-specialist enough about his subject along the way that we can easily follow his descriptions of the geology, biology, and chemistry behind these discoveries. Anyone interested in the intriguing questions of the origins of life on Earth and how those origins have been discovered will find this story the best place to start.

Some Assembly Required Neil Shubin 2020-03-17 An exciting and accessible new view of the evolution of human and animal life on Earth. From the author of national bestseller, Your Inner Fish, this extraordinary journey of discovery spans centuries, as explorers and scientists seek to understand the origins of life's immense diversity. "Fossils, DNA, scientists with a penchant for suits of armor—what's not to love?"—BBC Wildlife Magazine Over billions of years, ancient fish evolved to walk on land, reptiles transformed into birds that fly, and apelike primates evolved into humans that walk on two legs, talk, and write. For more than a century, paleontologists have traveled the globe to find fossils that show how such changes have happened. We have now arrived at a remarkable moment—prehistoric fossils coupled with new DNA technology have given us the tools to answer some of the basic questions of our existence: How do big changes in evolution happen? Is our presence on Earth the product of mere chance? This new science reveals a multibillion-year evolutionary history filled with twists and turns, trial and error, accident and invention. In Some Assembly Required, Neil Shubin takes readers on a journey of discovery spanning centuries, as explorers and scientists seek to understand the origins of life's immense diversity.

Quantifying the Evolution of Early Life Marc Laflamme 2011-02-28 This volume provides a detailed description of a wide range of numerical, statistical or modeling techniques and novel instrumentation separated into individual chapters written by paleontologists with expertise in the given methodology. Each chapter outlines the strengths and limitations of specific numerical or technological approaches, and ultimately applies the chosen method to a real fossil dataset or sample type. A unifying theme throughout the book is the evaluation of fossils during the prologue and epilogue of one of the most exciting events in Earth History: the Cambrian radiation.

Cradle of Life J. William Schopf 2021-10-12 One of the greatest mysteries in reconstructing the history of life on Earth has been the apparent absence of fossils dating back more than 550 million years. We have long known that fossils of sophisticated marine life-forms existed at the dawn of the Cambrian Period, but until recently scientists had found no traces of Precambrian fossils. The quest to find such traces began in earnest in the mid-1960s and culminated in one dramatic moment in 1993 when William Schopf identified fossilized microorganisms three and a half billion years old. This startling find opened up a vast period of time--some eighty-five percent of Earth's history--to new research and new ideas about life's beginnings. In this book, William Schopf, a pioneer of modern paleobiology, tells for the first time the exciting and fascinating story of the origins and earliest evolution of life and how that story has been unearthed. Gracefully blending his personal story of discovery with the basics needed to understand the astonishing science he describes, Schopf has produced an introduction to paleobiology for the interested reader as well as a primer for beginning students in the field. He considers such questions as how did primitive bacteria, pond scum, evolve into the complex life-forms found at the beginning of the Cambrian Period? How do scientists identify ancient microbes and what do these tiny creatures tell us about the environment of the early Earth? (And, in a related chapter, Schopf discusses his role in the controversy that swirls around recent claims of fossils in the famed meteorite from Mars.) Like all great teachers, Schopf teaches the non-specialist enough about his subject along the way that we can easily follow his descriptions of the geology, biology, and chemistry behind these discoveries. Anyone interested in the intriguing questions of the origins of life on Earth and how those origins have been discovered will find this story the best place to start.

Life Richard Fortey 2011-03-23 By one of Britain's most gifted scientists: a magnificently daring and compulsively readable account of life on Earth (from the "big bang" to the advent of man), based entirely on the most original of all sources--the evidence of fossils. With excitement and driving intelligence, Richard Fortey guides us from the barren globe spinning in space, through the very earliest signs of life in the sulphurous hot springs and volcanic vents of the young planet, the appearance of cells, the slow creation of an atmosphere and the evolution of myriad forms of plants and animals that could then be sustained, including the magnificent era of the dinosaurs, and on to the last moment before the debut of Homo sapiens. Ranging across multiple scientific disciplines, explicating in wonderfully clear and refreshing prose their findings and arguments--about the origins of life, the causes of species extinctions and the first appearance of man--Fortey weaves this history out of the most delicate traceries left in rock, stone and earth. He also explains how, on each aspect of nature and life, scientists have reached the understanding we have today, who made the key discoveries, who their opponents were and why certain ideas won. Brimful of wit, fascinating personal experience and high scholarship, this book may well be our best introduction yet to the complex history of life on Earth. A Book-of-the-Month Club Main Selection With 32 pages of photographs

Handbook of Atmospheric Science C. Nick Hewitt 2008-04-15 The alarming consequences of global climate change have highlighted the need to take urgent steps to combat the causes of air pollution. Hence, understanding the Earth's atmosphere is a vital component in Man's emerging quest for developing sustainable modes of behaviour in the 21st century. Written by a team of expert scientists, the Handbook of Atmospheric Science provides a broad and up-to-date account of our understanding of the natural processes that occur within the

atmosphere. It examines how Man’s activities have had a detrimental effect on the climate, and how measures may be implemented in order to modify these activities. The book progresses through chapters covering the principles of atmospheric science and the current problems of air pollution at the urban, regional and global scales, to the tools and applications used to understand air pollution. The Handbook of Atmospheric Science offers an excellent overview of this multi-disciplinary subject and will prove invaluable to both students and researchers of atmospheric science, air pollution and global change.

Earth System Evolution and Early Life A.T. Brasier 2017-06-09 This volume in memory of Professor Martin Brasier, which has many of his unfinished works, summarizes recent progress in some of the hottest topics in palaeobiology including cellular preservation of early microbial life and early evolution of macroscopic animal life, encompassing the Ediacara biota. The papers focus on how to decipher evidence for early life, which requires exceptional preservation, employment of state-of-the-art techniques and also an understanding gleaned from Phanerozoic lagerstätte and modern analogues. The papers also apply Martin’s MOFAOTYOF principle (my oldest fossils are older than your oldest fossils), requiring an integrated approach to understanding fossils. The adoption of the null-hypothesis that all putative traces of life are abiotic until proven otherwise, and the consideration of putative fossils within their spatial context, characterized the work of Martin Brasier, as is well demonstrated by the papers in this volume.

Great Waters Deborah Cramer 2002 In the course of an ocean voyage, Cramer offers a remarkable meditation on and spiritual exploration of one of our least appreciated natural resources: the Atlantic Ocean. 20 line drawings.

The Science of Astrobiology Julian Chela-Flores 2011-07-28 Since the publication of The New Science of Astrobiology in the year 2001—the first edition of the present book—two significant events have taken place raising the subject from the beginning of the present century to its present maturity. Firstly, in 2001 the Galileo Mission still had two years to complete its task, which turned out to be an outstanding survey of the Jovian system, especially of its intriguing satellite Europa. Secondly, the Cassini Huygens Mission was still on its way to Saturn. Its present success has surpassed all expectations of ESA and NASA. Astrobiologists still did not know that Titan was the fifth body in the Solar System that possibly contained a water ocean (including the Earth and the three Galilean satellites other than Io). For these reasons the book includes overviews of the evolutionary and molecular biology that are necessary. There is a discussion of other sectors of culture that are the natural frontiers of astrobiology, especially the humanities.

The Story of Evolution in 25 Discoveries Donald R. Prothero 2020-12-22 The theory of evolution unites the past, present, and future of living things. It puts humanity’s place in the universe into necessary perspective. Despite a history of controversy, the evidence for evolution continues to accumulate as a result of many separate strands of amazing scientific sleuthing. In The Story of Evolution in 25 Discoveries, Donald R. Prothero explores the most fascinating breakthroughs in piecing together the evidence for evolution. In twenty-five vignettes, he recounts the dramatic stories of the people who made crucial discoveries, placing each moment in the context of what it represented for the progress of science. He tackles topics like what it means to see evolution in action and what the many transitional fossils show us about evolution, following figures from Darwin to lesser-known researchers as they unlock the mysteries of the fossil record, the earth, and the universe. The book also features the stories of animal species strange and familiar, including humans—and our ties to some of our closest relatives and more distant cousins. Prothero’s wide-ranging tales showcase awe-inspiring and bizarre aspects of nature and the powerful insights they give us into the way that life works. Brisk and entertaining while firmly grounded in fundamental science, The Story of Evolution in 25 Discoveries is a captivating read for anyone curious about the evidence for evolution and what it means for humanity.

The Story of Life in 25 Fossils Donald R. Prothero 2015-08-25 Every fossil tells a story. Best-selling paleontology author Donald R. Prothero describes twenty-five famous, beautifully preserved fossils in a gripping scientific history of life on Earth. Recounting the adventures behind the discovery of these objects and fully interpreting their significance within the larger fossil record, Prothero creates a riveting history of life on our planet. The twenty-five fossils portrayed in this book catch animals in their evolutionary splendor as they transition from one kind of organism to another. We witness extinct plants and animals of microscopic and immense size and thrilling diversity. We learn about fantastic land and sea creatures that have no match in nature today. Along the way, we encounter such fascinating fossils as the earliest trilobite, Olenellus; the giant shark Carcharocles; the "fishibian" Tiktaalik; the "Frogamander" and the "Turtle on the Half-Shell"; enormous marine reptiles and the biggest dinosaurs known; the first bird, Archaeopteryx; the walking whale Ambulocetus; the gigantic hornless rhinoceros Paraceratherium, the largest land mammal that ever lived; and the Australopithecus nicknamed "Lucy," the oldest human skeleton. We meet the scientists and adventurers who pioneered paleontology and learn about the larger intellectual and social contexts in which their discoveries were made. Finally, we find out where to see these splendid fossils in the world's great museums. Ideal for all who love prehistoric landscapes and delight in the history of science, this book makes a treasured addition to any bookshelf, stoking curiosity in the evolution of life on Earth.

Human Physiology in Extreme Environments Hanns-Christian Gunga 2020-10-18 Human Physiology in Extreme Environments, Second Edition, offers evidence on how human biology and physiology is affected by extreme environments, also highlighting technological innovations that allow us to adapt and regulate environments. Covering a broad range of extreme environments, including high altitude, underwater, tropical climates, desert climates, arctic climates and space travel, the book also includes case studies that can be used to illustrate practical application. Graduate students, medical students and researchers will find this to be an interesting, informative and useful resource for human physiology, environmental physiology and medical studies. Includes coverage of current global challenges and their consequences on human physiology and performance Presents human physiological challenges in extreme environments Provides an excellent source of information on paleontological and anthropological aspects Offers practical medical and scientific uses of current concepts

From Stars to Brains: Milestones in the Planetary Evolution of Life and Intelligence Andrew Y. Glikson 2019-02-18 The permutation of basic atoms—nitrogen, hydrogen, oxygen, carbon and phosphorus—into the biomolecules DNA and RNA, subsequently evolved in cells and brains, defining the origin of life and intelligence, remains unexplained. Equally the origin of the genetic information and the intertwined nature of ‘hardware’ and ‘software’ involved in the evolution of bio-molecules and the cells are shrouded in mystery. This treatise aims at exploring individual and swarm behaviour patterns which potentially hint at as yet unknown biological principles. It reviews theories of evolution with perspectives from the earth sciences, commencing with the earliest observed records of life. This is followed by reviews and discussion of the building blocks of life, marine and terrestrial communities, the arthropods, birds and finally humans. It is suggested that, further to the mutation/natural selection processes established by Darwin and Wallace, an understanding of the evolution of intelligence remains little understood. A directionality of evolutionary trajectories is evident, not least the purposeful thinking process of humans as well as animals. It is not clear how directional intelligence, manifested for example by the collective intelligence of arthropod colonies, has evolved from mutation/natural selection processes. Potential clues for the understanding of life and evolution are provided by Aristotle’s dictum of “the whole being greater than the sum of the parts”, Niels Bohr’s principle of quantum complementarity and George Ellis’ theory of top-down causality. Inherent in the question of the origin of life is an anthropocentric bias, related to the self-referential Anthropic Principle and theological paradigms of man’s supposed dominion over all other species. The Anthropic Principle, however, should be capable of being circumvented using the scientific falsification method, assuming universal verified constants of physics. The phenomenon of the human mastery of fire and the splitting of the atom, leading to the seventh major mass extinction of species, remains incomprehensible.

Europa Robert T. Pappalardo 2017-12-15 Few worlds are as tantalizing and enigmatic as Europa, whose complex icy surface intimates the presence of an ocean below. Europa beckons for our understanding and future exploration, enticing us with the possibilities of a water-rich environment and the potential for life beyond Earth. This volume in the Space Science Series, with more than 80 contributing authors, reveals the discovery and current understanding of Europa’s icy shell, subsurface ocean, presumably active interior, and myriad inherent interactions within the Jupiter environment. Europa is the foundation upon which the coming decades of scientific advancement and exploration of this world will be built, making it indispensable for researchers, students, and all who hold a passion for exploration.

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