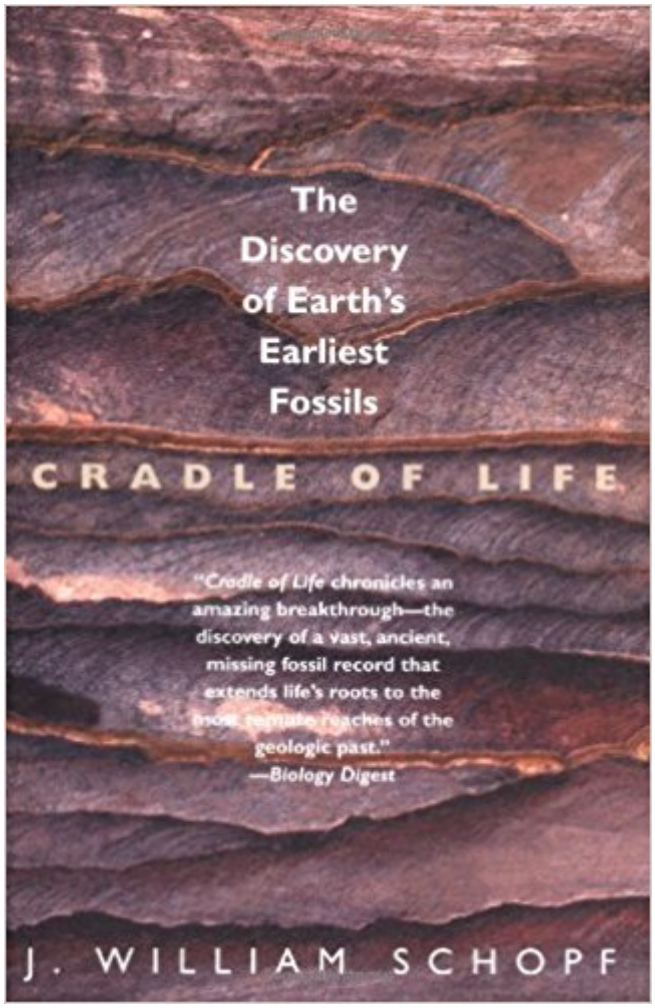
Cradle Of Life: The Discovery Of Earth's Earliest Fossils



Synopsis

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.

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Customer Reviews

What if U.S. history began in 1963, and everything that happened before that year was shrouded in mystery? There would be plenty of events to study, but we wouldn't have a complete picture of the country's past. This is the analogy that paleomicrobiologist J.Â William Schopf uses to describe the long-missing 85Â percent of earth's early fossil record (the puzzle of the missing fossils was known as Darwin's Dilemma). Not until the 1960s did paleobiologists using pickaxes and microscopes find evidence that life began much earlier than previously theorized and that microorganisms were the planet's only inhabitants for most of its existence. And Schopf himself discovered the oldest Precambrian fossils known to science in 1993. Why did it take so long to find these critters? Though the puzzle of the "missing" early fossil record lived on for more than a hundred years, its solution is now so obvious as to be mundane. The Precambrian world did indeed swarm with living creatures, but until near the close of this vast eon these were microbes and microalgal cells so tiny and fragile that they would never have been unearthed by conventional fossil hunting. Cradle of Life is a great primer for those interested in the fossil record and its relation to evolutionary theory. Profusely illustrated, this chronicle of amazing discoveries and bizarre questions covers wide ground, including the basics of cell biology and microevolution as well as the careers of the big-name scientists who have set the fossil record straight. And the search continues for the origins of life on earth, as well as the hints of it elsewhere. In a terrifically enlightening epilogue, Schopf shows how even the best scientists have been fooled by geological artifacts that resemble true fossils (as happened with the infamous Martian meteorite "bacteria") and by their own desires to confirm their theories and beliefs about the origins of life. --Therese Littleton --This text refers to the Hardcover edition.

Until the mid-1950s, biologists, geologists and paleontologists seeking early life's traces had to make do with fossils from the Phanerozoic periods, which represent only 15% of the time that life has existed on Earth. The first 85%Athe Precambrian EraAremained obscure. But since the discovery of "microfossils" in Canada's Gunflint rocks, "Precambrian studies have boomed": these fossil microbes constitute our direct evidence about primordial life. Schopf, a professor at UCLA's Institute of Geophysics, adopts an unusually informal first-person style for this rangy exploration of how Precambrian fossils came to light and what they've taught us. The author covers the history of

evolutionary thought and the exploits of field paleontologists, as well as the trajectory of his own career. The casual prose brings both rewards and perils. Most readers will want to know, for example, that in 1924 Aleksandr Oparin explained how simple molecules with carbon, hydrogen, oxygen and nitrogen might have "given rise to the first cells." Few, however, will care that Schopf once lunched with Oparin ("It was thrilling!") or that a limestone slab Schopf found in China "is now embedded in the entry way at our home." What reader needs to be told that, "in science, technical terms are simply shorthand notations for ideas"? Subtract the self-referential elements and Schopf's book is a very clear introduction to the first living things. Final chapters tie these early organisms to the photosynthetic cyanobacteria on today's earth, digress into the history of paleontological frauds and explain what Schopf thinks is right and wrong in NASA's search for fossilized life on Mars. 80 b&w illustrations. Copyright 1999 Reed Business Information, Inc. --This text refers to the Hardcover edition.

Cradle of Life recounts the relatively brief history of the beginnings of the scientific field of paleobiology from questions posed by Darwin, to the latest discoveries of Schopf himself. The unique personal point of view allows the most casual reader to follow Schopf along through his pursuit of a great scientific discovery from his time in undergraduate studies through the analysis of the oldest fossils known to man. The detailed evidence supporting the claims on the age of these fossils and their biological origins are presented in a clear format covering enough detail for the scholar, yet understandable for each person to learn more about these incredible ancient organisms. Schopf uses the book for more than just a platform to describe his own work and the history leading up to that discovery. The purpose of Cradle of Life is for the education of science and scientific theory. Multiple examples are presented in which politics, religion, the media, or personal issues can cause scientists to make false claims, or claims with which they do not have the proper evidence to back up. In the words of Carl Sagan, "extraordinary claims require extraordinary evidence." There have been many cases in the young field of paleobiology in which claims have not stood the test of time because of lack of extraordinary evidence. These claims have hindered the field for some time, even decades in some cases. Schopf writes this to provide an example through his career of making an extraordinary claim based on highly detailed and through evidence. This book is greatly encouraging to science as the field of paleobiology progresses as long as careful patience and clear statement of facts are present to ensure that mistakes and claims are made to withstand the trials they will face.

Wow. I am surprised at how much has been learned about the early phases of life's development since I last formally studied paleontology. One of my favorite areas of study was invertebrate and early life forms. At the time only a modest amount was known about stromatalites and cyanobacteria. The trace fossils of the soft bodied, multicellular, Ediacaran fauna were known but were considered "late" in geologic and biologic terms. The Burgess Shale community, made famous by Gould's "Wonderful Life" in the late '80s, was known, but the organisms were confusing and many have since been restudied and reclassified. Having been a leading actor in the field of microfossils and early bacterial life forms, Schopf puts everything into perspective in his book, making it virtually a history of research into the topic of life's beginnings.Cradle of Life begins, as such books so often do, with a brief synopsis of Darwin and his theory of evolution, including most critically, its early problems. Thereafter Schopf begins a veritable "who's who" of early paleontology, giving short professional biographies of those who worked in the field as early as the 19th century. He points out where promising leads were suppressed by virtue of the lesser standing of the individual proposing them, and misleading theories given credence because they were proposed by someone of powerful academic credentials. Some of the tales are impressive object lessons in how things can go wrong for human reasons and why science ultimately "gets it right in the end."One of the more interesting topics the author confronts is how our recent advances in the field of paleontology might help determine whether life exists or has ever existed elsewhere. The author provides an interesting perspective on the Mars meteorite "life forms" that shows how easily it is to be lead astray by high hopes, and how space research scientists can benefit by a familiarity with modern precepts applicable to early life studies on this planet.The book goes into great detail about the discovery of early life, what forms evidence takes, how it can be mistaken, what information is derived from study of the remains, and what indirect evidence tells us about the early earth. It also discusses how life might have evolved from non-life, how it managed to get started so early, how the atmosphere changed and how that change affected the diversity of earth's biomass. For those who are only casually interested in the topic of fossils, this book might be a little too much information. I love this kind of stuff, but I could certainly see how others might find it incredibly boring. I doubt that those in junior high would find it rewarding, but those in senior high might have enough science background to understand and enjoy it. Certainly for anyone fascinated with science and by how paleontology works, this book will be right up your alley.FOR THOSE WRITING PAPERS: in paleontology, biochemistry, biology, evolution, and history of science, this book would make an excellent bibliographic entry as well as a good source of topics. One might discuss how science works, how "authority figures" can derail even the best ideas, how science like other human

endeavors are affected by culture, expectations, what is "known" already, etc., how progress in technology has allowed us to learn more about the distant past, how the tendency to specialize can delay progress, how a recent trend toward consilience (for which see Consilience: The Unity of Knowledge by E. O. Wilson) might lead to more rapid advances in science. One might compare the work by Nick Lane (see Oxygen: The Molecule that made the World) or by G. Cairns-Smith (Seven Clues to the Origin of Life) to this one to see how their perspectives are the same and how they differ. What do you believe is ultimately supported by the data?

If you want to learn about the subject of paleobiology, the history of early life on earth and the hunt for life's origins, read this book. It's not a quick read, Tom Clancy type novel and will take a bit of effort, but it is effort well spent. Author J. William Schopf manages to intelligibly cover the first 3.5 billion years of the history of life on earth and how it has been discovered in only a couple of hundred pages. To make sure he doesn't loose his audience Schopf provides help with the basics by inserting charts and digressions in which he explains the necessary technical language and background facts needed by the lay reader to understand the big picture story. Although the book should be quite satisfying to someone with a scientific bent, non-technical readers with just a little perseverance will read and enjoy this book because the story Schopf tells is fascinating.Imagine: life begins only a short time after the earth is formed out of the solar nebula, but changes little for hundreds of millions of years. Were those first forms of life plants or animals? Be prepared for the surprise answer.Very early life consisted of one-cell organisms. What did the first forms of life visible to the unaided eye look like and where did they live? Once again, be prepared to be surprised.How did scientists ever find fossils of these one celled organisms amidst the millions of square miles of rocks on the earth's surface? The answer has something to do with fishing.These answers and much, much more await the reader.The book is not perfect. There is an over-long chapter on the possibility of life on Mars and a little too much about the rivalries between scientists, a subject which deserves it's own separate treatment. But the fascination of the story and the clear, matter of fact style of presentation make this a must read for anyone interested in the early history of life.

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