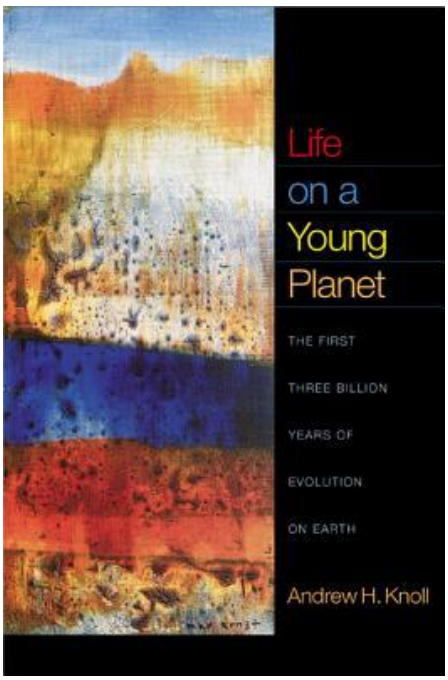

Life on a Young Planet: The First Three Billion Years of Evolution on Earth

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Australopithecines, dinosaurs, trilobites--such fossils conjure up images of lost worlds filled with vanished organisms. But in the full history of life, ancient animals, even the trilobites, form only the half-billion-year tip of a nearly four-billion-year iceberg. Andrew Knoll explores the deep history of life from its origins on a young planet to the incredible Cambrian explosion, presenting a compelling new explanation for the emergence of biological novelty.
The very latest discoveries in paleontology--many of them made by the author and his students--are integrated with emerging insights from molecular biology and earth system science to forge a broad understanding of how the biological diversity that surrounds us came to be. Moving from Siberia to Namibia to the Bahamas, Knoll shows how life and environment have evolved together through Earth's history. Innovations in biology have helped shape our air and oceans, and, just as surely, environmental change has influenced the course of evolution, repeatedly closing off opportunities for some species while opening avenues for others.
Readers go into the field to confront fossils, enter the lab to discern the inner workings of cells, and alight on Mars to ask how our terrestrial experience can guide exploration for life beyond our planet. Along the way, Knoll brings us up-to-date on some of science's hottest questions, from the oldest fossils and claims of life beyond the Earth to the hypothesis of global glaciation and Knoll's own unifying concept of "permissive ecology."
In laying bare Earth's deepest biological roots, "Life on a Young Planet" helps us understand our own place in the universe--and our responsibility as stewards of a world four billion years in the making.

Life on a Young Planet: The First Three Billion Years of Evolution on Earth Details

Date	:	Published September 19th 2004 by Princeton University Press (first published 2003)
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From Reader Review Life on a Young Planet: The First Three Billion Years of Evolution on Earth for online ebook

Dave Malone says

I found this book listed as a top volume to read about the history of the beginning of the earth / life on our planet. I was very pleased. It's a great read, fascinating, and very well written. He has a great writing style and a quick sense of humor to get across his points about paleontology. As other reviewers have noted, be aware this is about life on the planet when it was just bacteria--there isn't much talk of animals, but that was fine with me--I wanted to know about the earliest of origins, befre humanoids. :) I felt like this was a solid read for my self-guided education on the history of the earth.

Fred Dameron says

This book gives me more hope for earths future. I don't mean as far as humankind currently committing our own extinction is concerned; I mean that after we kill ourselves off in a purple algae world the recovery time will be, "A mere tick of the geological clock."

Let me explain.

It took around 3,000,000,000 years for the first chemicals to start joining together and forming microscopic life. That life was living in a sulfide/sulfate world. We can't live in a sulfide/sulfate world but purple algae can and did in huge, 100,000 of km across mats. This book explores these mats or what is left of them from Svalbard to Central Siberia. What was found was also small colonies of green algae in parts of these mats in the upper levels of these mats as the rock become younger. Since the current world is an Oxygen world those mats of green algae will be larger. The remnants of what we as humans leave the future. Green Algae mats in large quantities is our legacy. This will mean a quicker recovery time to get to another Cambrian explosion. After Cambrian part duex all we need is another 650,000,000 years and "Mankind" or if you prefer "Hominids" are back on top. This is where we need to look.

What message can we leave those "Hominids" of the future? Maybe they aren't hominids but some form of intelligent life, but still what message can we leave them? I would suggest that we deflesh and engrave in binary, a warning to these future intelligent beings, a warning. The warning should be "If you are reading this you have invented computing devices. If so you are probably burning carbon. The release of CO2 into our atmosphere led to our extinction. Save your selves and stop." They may not but if they keep the skeletons we bury now and bury their own. Assuming that eight to ten billon years until our sun explodes is correct. Earthlings have ten times to do this before our sun explodes and it no longer matters. If we don't leave a message for the future in a thousand years or so the last human will look on the last day and die from lack of oxygen and in 750,000,000 years another intelligent being will do the same. Intelligent humans aren't that smart. Hopefully we can help a future generation of intelligent beings save themselves.

This is a great science work and a readable piece on our early life. This early life will be repeated if we don't go to a renewable world. To find out about that future world look to the past and this book goes to that time before the Cambrian when life was microscopic, 10 nanometers, and purple. Great read.

Corinna Bechko says

Nicely written and well argued, especially in later chapters when the concept of "snowball Earth" reared its head.

Clyde says

The study of the history of life on this planet has come a long way. Knoll pulls it all together nicely in this well-written volume. Though not simplified, the clear and logical writing make it accessible to the educated and curious layman. The numerous charts, photographs, and diagrams are a huge plus.
First Knoll sets the framework for what the book aims to achieve. Then each chapter centers on a different aspect of the journey of life. As the book builds, we learn how biological, physical, chemical, geological, and environmental processes interacted over deep, almost incomprehensible spans of time to cumulate in the wondrous explosion of multicellular life in the Cambrian (and thus eventually produce the world that we know).
Very good book.

Joshua says

Great breakdown of early life on Earth

This gives a fascinating perspective on early life, integrating geology, paleontology, and microbiology to fill in the knowledge gap of Earth's early history. Recommended read but it can get a bit bogged down in the geology for my taste. I had no trouble rushing through some details of rocks to get to the heart of our current knowledge on the evolution of early unicellular organisms and eukaryogenesis. Citations are replaced with recommended reading at back- a major drawback. I would have preferred more formal citations as I like to to look up primary literature for topics of interest.

Jimagn says

Very well researched and presented. Covers a time period with which most are not familiar. The author presents the research as a good scientist, with a healthy dose of skepticism, while basing conclusions on well established research. He points out areas where more research is needed. He has his own theories, and is careful to present them as such. A good read, especially if you've heard of snowball earth and want some more background.

Stephen Palmer says

I very rarely give 5/5 reviews, and then only to classics, but this is too good to receive four stars. It's an

exceptional guide to the current state of thinking about the three billion years of the evolution of life leading up to the Cambrian Explosion. Written by an expert in the field, with a whole professional life behind him, it's superbly, clearly and engagingly written - I haven't read a natural history book as good as this for a while. All phases of life are covered, from the very earliest up to the Cambrian Explosion itself at 541 million years ago. The author is fair-handed, giving alternative evaluations where appropriate and mentioning all the main players in the field. Nor do you need much scientific knowledge to appreciate this book; it's written with style and clarity. In a nutshell - exceptional.

Toby says

An absolute joy to read. It explains what early life was like and how it evolved. Clearly explaining the theories and practices of the interdisciplinary sciences involved, this book is one of the best books on evolution I've read. What I like about it is that its not so abstract and heavy on the theory like other books on similar subjects seem to be, it focuses mostly on the facts and presents a few theories very clearly when facts are not present. You will learn a lot from this book, which is what makes it so great. It is meticulously researched and a true source of knowledge. This is a great book for students with a background in biology (you will need to be familiar with some biological terms), and specialists in the field. But anyone with an interest in evolution shouldn't shy away either. Just be ready to spend some time getting through this book, it can be difficult. It makes a great companion to Fortey's "Life: A Natural History of the First Four Billion Years of Life on Earth", which mostly discusses the multi-cellular animals we are more familiar with. This book focuses mostly on single-celled organisms.

Chris Farrell says

This book is a totally fascinating, if often impenetrable, review of the recent science of the early life and ecology of Earth. Chemistry was my science of choice in college, but I hadn't really kept up in the interim, I found the more recent advances in our understanding of how early single-celled life developed and evolved and created the conditions for more complex life by modifying the atmosphere engrossing. Other interesting topics include how periodic extinction events may have cleared the way for subsequent explosions and how radically different the climate was in the past (including theories that may have had Earth as a virtual snowball for a time).

Unfortunately, the writing and style is frequently impenetrable - I haven't had to work this hard on a book in a long time, and I'm glad I remembered a fair amount of my university biology and biochemistry. The author just assumes you understand things like the Krebs Cycle, Golgi apparatus, mitochondria, carbon and nitrogen fixing, respiration, and so on, as he talks about them without explanation. The narrative structure of the book jumps around a lot without explanation and while chapters focus on individual topics, they lack coherence and are often just a scattershot of recent science. Compared to the really great science writing of Brian Greene, Neil deGrasse Tyson, Mary Roach, and others, this is a mess.

Despite the difficulties, I enjoyed plowing through this. But I have to believe there is a better-written, more accessible book on this topic out there somewhere.

Nick Winlund says

An exceptional overview of the paleontological, biochemical and geochemical processes and mechanisms that made up our early Earth. The book goes into sediments, metamorphic rocks, fossils, ocean chemistry and atmospheric processes. Concise and well written!

Troy says

Andrew H. Knoll is a paleontologist who is particularly conversant with the integrative approaches of modern day evolutionary science. Rooted in the rocks, he writes with skill about the geological and geophysical processes at work in early earth formation, and their implications for the evolution of life. He explains the complex geochemistry that became, in time, a biochemistry. He describes the so-called evo-devo (I.e., evolutionary developmental biology) revolution with verve-both as an observer, and a participant/contributor. He describes in some detail how the evolution of life is largely one of microbiologic changes through geologic time. Some critics fault him for leaving the good stuff for the end-a bizarre criticism given that the "good stuff" (I.e., complex multi-cellular animal life) has only been around since very recent times in geological terms. Knoll deftly defeats this prejudice by pointing out that while animals are the kings of morphological variety, it is the microorganisms that are the exemplars of metabolism. Microbes have evolved diverse mechanisms for surviving on a catastrophically evolving planet. It is in fact, the microbes that made the planet habitable for animals. This is a story as epic and heroic as any produced by evolutions most complex, and ridiculously recent, product. If I had a quibble with the book, it was with the decision to include the final chapter about the possible Martian origin of terrestrial life. Not to say this story wasn't interesting, but it would have been better left to another book. Finally, Knoll's conclusion attempts to reconcile the seemingly ever-opposed science and religion and is reminiscent of Stephen J. Gould's "twin magisteria" argument. The stronger part of his conclusion reminded us that past may be prologue: That current action or inaction may have consequences in what could be, but doesn't have to be, our own evolutionary endgame.

Marc says

A fascinating book about the first three billion years of life on Planet Earth. It’s a story well told and beautifully written, with lots of information, and some really entertaining anecdotes. Knoll knows how to present the relatively uneventful evolution of unicellular life interesting and with style.

Madeleine says

Thing to keep in mind: The First Three Billion Years of Evolution on Earth sounds fascinating, but nothing much bigger than a microbacteria actually *evolved*. This book ends just as stuff starts growing legs and arms and wings and crawling out of the ocean and generally becoming *interesting*.

This book should be named: "rocks--with microscopic fossils, in places with funny scandanavian names." But that's probably what you should expect when you get book recommendations from geologists.

Joking aside, I definitely learned stuff. I'd suggest the book to anyone (like me) who only ever took two years of biology, and both years were taught by someone who didn't believe in evolution. But I'm excited to move on to the next phase of prehistory for my next evolution book, and read about things with more than one cell. There's only so long you can read about bacteria and then get really excited because instead of reading about bacteria you are now reading about....oooooo...algae!!!

On an unrelated note, I think someone put a curse on Alaska Airlines.

John says

On one hand, this book is remarkably accessible. This book could be going straight for the deep end, requiring a background in paleontology, molecular biology, and geology. For somebody with none of these things, beyond fuzzy memories of grade school science and some popular science reading, you will understand most everything that is happening here and find quite a bit of it compelling.

On the other hand, this book is really scattered. Almost every chapter starts with some "We're here in this remote place" Indiana Jones-style posturing, almost always to reveal two paragraphs later that they've dug up yet another chunk of chert and never really make anything of the place again, too deep inside the analysis. Sometimes it flows really well, and sometimes it really gets stuck inside of current academic debates. Holistically, though, you aren't always given a sense of what the significance of what was going on. It really needed much more in the way of summarizing what had been said. The epilogue's sudden focus on the present comes out of nowhere.

Overall, this book is good at leading you to interesting ideas but not that great at leading you out of them with a coherent sense of where you had been. I think a more explicit sense of continuing along a timeline, whether the Earth's or the author's own development, would have helped considerably. Nonetheless, I really feel better informed about a lot of these areas and found the details intriguing, though I never did form them into a larger mental picture.

Batsheva says

A little slow going at first, but a fascinating look at the study of ancient microfossils. The majority of the time life was on planet Earth (~3 billion years), it existed predominantly as single-celled organisms. We owe our habitable planet (and its established biogeochemical cycles) to the metabolism of tiny living beings from long, long ago.

Peter Tillman says

This is an appealing combination of a natural history of the first three billion years of life on Earth, which is (roughly) the author’s professional specialty, along with a scientific memoir of his pertinent field work. Knoll is a good writer, and despite the book’s publication 15 years ago (2003), you won’t go seriously astray. I read this book in parallel with Nick Lane's Mitochondria book https://www.goodreads.com/book/show/3... (which I found a much harder read). They both cover some of the same ground, but the differing approaches of a field paleontologist and a laboratory biochemist make for some interesting "compare & contrast"

moments. They're both good writers and good scientists. I was more comfortable with Knoll, but then I’m a geologist.

Knoll intended his book to be understandable to a general audience, but there are some frustrated comments from readers here suggesting that he didn’t always succeed. I think the book will work best for readers who have some previous knowledge of geology and paleontology. General readers may want to do some skimming, or better, some homework. Knoll does supply a pretty good selection of color and b/w photos, and cladograms! --which remind me of how far back in the dim past my classwork on this stuff was. And the perils of trying to be an autodidact, later on.

Martin Oetiker says

This is a beautifully written, well argued account of the history of life on Earth from earliest signs of biochemical evolution 3.8 Bya to the Cambrian explosion of multicellular organisms 550Mya, by one of the leading experts in this field. It includes first hand details of the fieldwork and laboratory analyses carried out by himself and many others, and the evidence painstakingly gleaned, that underpin the latest theories in evolutionary sciences. It covers all the major innovations of life including the first pre-biotic molecules, the formation of cell membranes, various prokaryotic metabolic strategies, symbiosis and the origins of photosynthesis, leading to eukaryotic cells sexual reproduction and finally the creation of the first multicellular organisms. In addition it stresses the complex interplay between biology, geology and environment such as plate tectonics and global glaciations in stimulating evolutionary innovation. Andy Knoll is an excellent communicator able to present complex facts and ideas in an exciting and engaging way. Highly recommended.

Stan says

This is a fascinating book. The author takes the reader on a journey through the development of life on early earth and shows the multiple lines of evidence used to reach the conclusions he presents. My only criticism, and the reason I gave the book four stars, is that the writing is a heavy slog. I understand the subject matter does not lend itself to easy reading, but in some cases the reader must reread sections or paragraphs in order to follow the idea being put forth. The author's enthusiasm is apparent; I just wish the enthusiasm translated better.

Jonathan Robinson says

Pretty good stuff. The author has obviously been a successful presence within a growing academic field over many decades, so he's got a lot to say. It wasn't the most gripping read I've ever had, but then it is ultimately heavily based around geology and fossils and that's never been the area of science which has gripped me the most.

Ana says

Read for Geology 143 class.