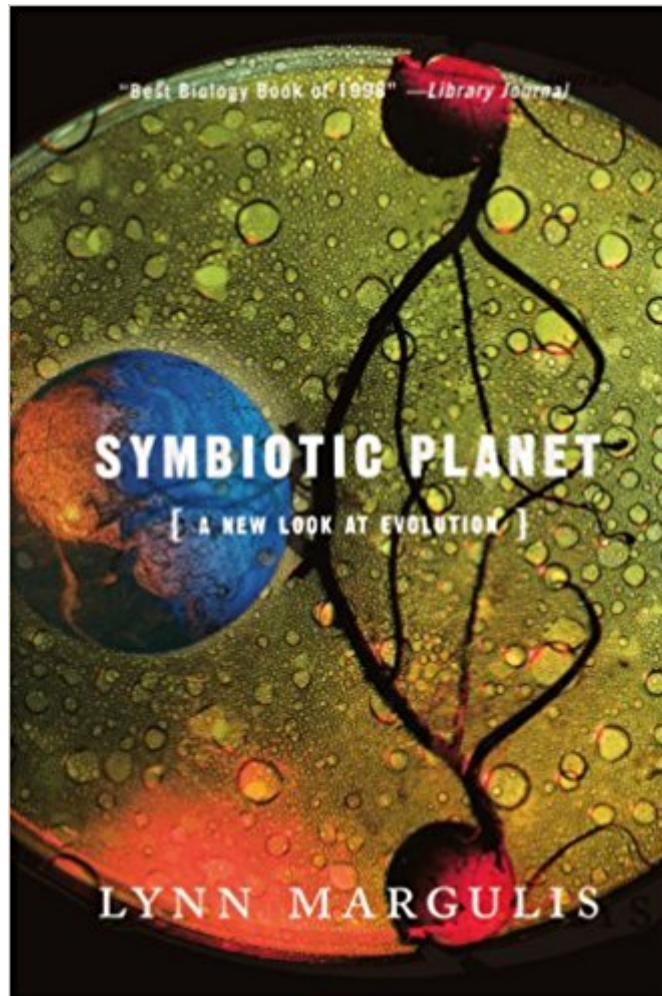




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# Symbiotic Planet: A New Look At Evolution



## Synopsis

Although Charles Darwin's theory of evolution laid the foundations of modern biology, it did not tell the whole story. Most remarkably, *The Origin of Species* said very little about, of all things, the origins of species. Darwin and his modern successors have shown very convincingly how inherited variations are naturally selected, but they leave unanswered how variant organisms come to be in the first place. In *Symbiotic Planet*, renowned scientist Lynn Margulis shows that symbiosis, which simply means members of different species living in physical contact with each other, is crucial to the origins of evolutionary novelty. Ranging from bacteria, the smallest kinds of life, to the largest—the living Earth itself—Margulis explains the symbiotic origins of many of evolution's most important innovations. The very cells we're made of started as symbiotic unions of different kinds of bacteria. Sex—and its inevitable corollary, death—arose when failed attempts at cannibalism resulted in seasonally repeated mergers of some of our tiniest ancestors. Dry land became forested only after symbioses of algae and fungi evolved into plants. Since all living things are bathed by the same waters and atmosphere, all the inhabitants of Earth belong to a symbiotic union. Gaia, the finely tuned largest ecosystem of the Earth's surface, is just symbiosis as seen from space. Along the way, Margulis describes her initiation into the world of science and the early steps in the present revolution in evolutionary biology; the importance of species classification for how we think about the living world; and the way 'academic apartheid' can block scientific advancement. Written with enthusiasm and authority, this is a book that could change the way you view our living Earth.

## Book Information

Paperback: 176 pages

Publisher: Basic Books; Revised ed. edition (October 8, 1999)

Language: English

ISBN-10: 0465072720

ISBN-13: 978-0465072729

Product Dimensions: 5.1 x 0.4 x 8 inches

Shipping Weight: 8.3 ounces (View shipping rates and policies)

Average Customer Review: 4.4 out of 5 stars 35 customer reviews

Best Sellers Rank: #440,706 in Books (See Top 100 in Books) #139 in [Books > Textbooks >](#)

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## Customer Reviews

From the origin of life to the classification and phylogeny of living organisms, from a discussion of GaiaAthe belief that Earth operates like a living beingAto a discussion of the underlying reasons for sex, iconoclastic biologist Margulis (coauthor, *What Is Sex?*, etc.) takes on many of the big questions in biology in this small, rambling and informal tract. In a book that is part autobiography and part biological primer, MargulisAthe scientist most responsible for the theory that animal and plant cells originally arose by combining with simple bacteriaAadvances the idea that a large part of organic evolution can be explained by symbiosis, "the living together in physical contact of organisms of different species." Rather than convincing readers of this theory, however, she seems content to lavish most of her attention on basic biological concepts. While Margulis conveys a sense of the wondrous and intricate origins of life, many of the issues she touches upon here are more clearly and comprehensively dealt with in her other works. 11 b&w illustrations. Copyright 1998 Reed Business Information, Inc. --This text refers to an out of print or unavailable edition of this title.

For 30 years, the Gaia theory of life on Earth has remained vital, dynamic, and controversial. One of its leading advocates provides a synthesis and overview of the current status of the theory, plus a few important new ideas of her own. Copyright 1999 Reed Business Information, Inc. --This text refers to an out of print or unavailable edition of this title.

I became interested in this book because of Lynn Margulis's theory called symbiogenesis. This evolutionary term refers the origin of tissues, organisms and even species through a long-term form of symbiosis. After describing her early start in the subject matter, she notes that she has always felt that genetics was the key to evolutionary history. She observed that three classes of organelles located outside of the nucleus of a cell (plastids, mitochondria, cilia) "resembled bacteria in their behavior and metabolism."In the chapter on Individuality by Incorporation, she tries to make the case for the symbiotic process. For example, an archaebacterium merges with a swimming bacterium, which subsequently merges with an oxygen-breathing bacterium, which subsequently engulfs, but fails to digest, a photosynthetic bacterium ultimately evolving into a swimming green algae. It is believed that our mitochondria in our cells and the chloroplasts in plant cells are of bacteriological origin. These processes are part of the theory called Serial Endosymbiosis Theory or SET. Margulis next delves into the problems with taxonomy or the classification of life. She discusses Robert Whittaker's (1924-1980) five-kingdom classification, but then goes on to develop a modified version that she feels more accurately "reflects the evolution of protoctists from symbiotic

bacteria, and of animals, plants and fungi from protocists."In discussing evolution, the author notes that the bacterial cell is the minimal unit of life, and this is where one must begin. These organisms are like more advanced life; they use energy to take up food, have DNA and RNA and proteins, and use chemical reactions to keep themselves going. It is interesting to note that "no life-form exists outside a self-maintaining, self-reproducing cell." She spends a chapter discussing the possible origins of sex which I found interesting. Moving on to the evolving of life on land, Margulis feels strongly that symbiogenesis is what made habitation on land possible. She concludes the book with a chapter on Gaia, which she defines as the physiologically regulated Earth, or the "system that emerges from ten million or more connected living species that form its incessantly active body."I found the book fairly readable for the layperson; however, you may have to research some terminology. In one chapter, for example, I came across a few undefined words or expressions, such as photosynthate food, fungal hyphal networks, and chitinase enzymes to name a few. The concept of SET is very interesting, and it appears to be another facet in our quest to understand the process of evolution.

This thin book is an eyeopener for anyone not acquainted with the concept of symbiogenesis, the idea that new species occur through symbiosis. Although her work is with protists, symbiosis is found in multicellular organisms such as trees, cows, termites, etc. One protozoa is even made up of five organisms. Her theory met with considerable opposition, and Margulis points to her predecessors, both Americans and Russians for similar work, as well as her contemporaries. We also get a snippet about her life and how a series of events led her to her present scientific and personal position. An extension of her theory to a planetary basis is Lovelock's Gaia theory which, in turn, has received considerable opposition and scorn. That, too, was preceded by a Russian scientist named Vernadsky.

Eating and reproducing among even the tiniest life forms is made into an incredibly fascinating journey by Lynn Margulis in this skinny publication. I found myself cheering for her explanatory theories of evolution all the way. There is something very compelling about including bacteria in the grand narrative about evolution not just in the case of humans, but in general, after all it was tiny bacteria and simple cell organisms that turned this planet into the blue gem it is today. The details of her theories are a little more involved and therefore more complicated to explain here. It is a worthwhile read even for readers who doubt their backgrounds in biology as she makes everything as clear as possible for lay readers.

Bacteria merging and becoming parts of cells, organelles, i.e. creating new organisms, is the idea behind the evolution discussed in this book. That is putting it in simple terms. If you have some basic biology education, this book will add a lot to your understanding of how evolution, outside the nucleus of cells, takes place, perhaps far more meaningful than the odd mutation which occurs in nuclear DNA.

Very impressive and revealing. I was so interested to learn more about the idea of symbiosis in cell evolution. I have read that there is a lot of controversy about her teachings and ideals. But regardless, she does prove some incredible points about the mystery of early life on this planet and points out that we are all living symbiotic beings, or living ecosystems as some say, and that even after learning this, we still cannot help but take it for granted.

Beyond anything else this book should dispel the folk interpretation of Darwinism, the misconception that survival of the fittest is as simple as dog eat dog competition. Symbiotic Planet tells the story of the integral quality of life. Margulis details in sophisticated, yet readable, prose the way in which evolution has progressed by bringing together life forms to build more complicated structures.

An absolutely great book! If anyone wants to open their mind regarding the origin of humanity, this starts at the very Beginning. The author does not speculate as to where our human form might go, but there is plenty of ground to cover between our origin and today.

Perhaps if she were male Lyn Margules would have multiple Noble prizes and be one of human kind's most celebrated scientists. Brilliant, clear, insightful, view changing, and easy to read.

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