

BOOKS: AGREED: "WE ARE NOT ALONE"

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Full disclosure: I am reviewing "We Are Not Alone: Why We Have Already Found Extraterrestrial Life" from the perspective of having declared that life was discovered on Mars in 1976 by the Viking Labeled Release experiment. So I am a believer in life on Mars. Having found life on the only other planet searched, I believe there must be life on other planets; but, in any event, Mars assures us that we are not alone in this universe. That said, the authors of "We Are Not Alone" have done a first-rate job in researching the subject of alien life, accumulating and condensing it, and then translating the condensate into lay language. Despite its lack of scientific jargon, the well-illustrated book is likely to bring new information even to astrobiologists steeped in the subject. And it might even convince some nonbelievers.

The book's primary focus is Mars, starting with Washington State University geologist Dirk Schulze-Makuch's previously published (in the *International Journal of Astrobiology*) conclusion that life was detected by the Viking Labeled Release experiment (of which I was the project leader). However, he and science writer David Darling postulate, the kind of life detected by the experiment is not the kind of life we know, based on carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur. Instead, they say, this Martian life uses a hydrogen peroxide-water mixture for its metabolism and for protection against freezing. I should note that recent reports of methane and formaldehyde on Mars support evidence for the kind of life we are familiar with, as these gases are among its products; however, Schulze-Makuch and Darling might argue that their putative new life forms could also produce these gases.

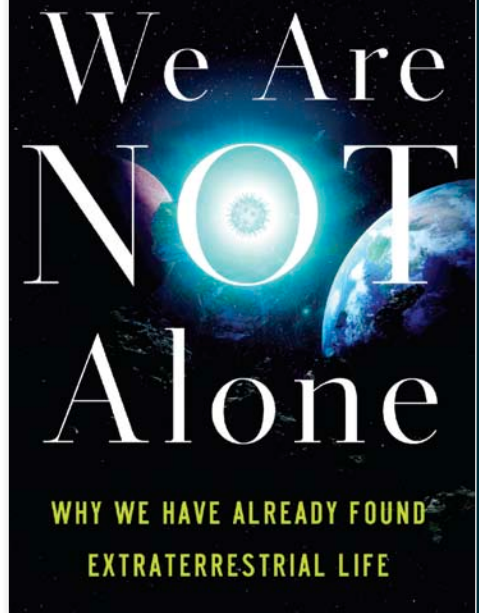
But the book isn't limited to the potential for life on Mars; it extends

its quest to planets throughout the universe. The book begins with a helpful "Chronology of the Quest for Alien Life," which details each of our major scientific steps in this pursuit, beginning with Earth-based observations and going to the only direct experiment ever launched to seek extraterrestrial life, the Viking Labeled Release experiment. Along the way, the book reviews subsequent missions that didn't seek life directly, but looked for evidence of liquid water, past or present, as well as possible habitats that may be suitable for life.

Then the book rapidly — at least it seems rapid because of how it whets your appetite — moves on to discuss concepts that have been proposed for life on other planets and moons within our solar system. First, the authors point out, life has been found virtually everywhere on Earth, even in harsh environments like deep-sea vents and hot springs. The authors extend this implication of a biologic imperative to such seemingly unlikely places as the clouds of Venus and Jupiter; the liquid water seas believed to be below the thick, eternally frozen ice surfaces of Jupiter's moons Io, Europa and Ganymede; Saturn's Enceladus and Titan (and in its heavy atmosphere); and even sun-distant Neptune's Triton. Furthermore, the authors point out, the hundreds of planets being discovered around distant stars suggest that many such planets exist within "habitable" zones. Any place in our universe could hold some form of life, they argue, including metabolic systems that might operate under forbidding conditions.

The book ends on the toughest problems of all: How, where and how many times did life originate, and how often does it evolve intelligence? These problems probably won't be any easier to answer in the future, however; the authors suitably lament the current and anticipated NASA budget cuts that will delay our tantalizing search.

Dirk Schulze-Makuch & David Darling



"We Are Not Alone: Why We Have Already Found Extraterrestrial Life," by Dirk Schulze-Makuch and David Darling. Oneworld Publications, 2010. ISBN 9781851687190. Paperback, \$19.95.

"We Are Not Alone" provides a broad panorama of the subject of extraterrestrial life. Furthermore, its depth ranges from humankind's earliest contemplation of the subject to its present status, and speculates beyond. That said, the authors do not quite deliver on their title, "We Are Not Alone." They come within a hair's breadth of saying that alien life has been found, but instead they insert disappointing caveats. And in the book's conclusion, the authors actually rescind their title by stating, "We've given, in this book, good reasons to suppose that we are not alone even in our own little neck of the cosmic woods."

In the end, the book succeeds in making for an interesting, informative and enjoyable read.

Levin is an adjunct professor at Arizona State University in Tempe, honorary professor at Cardiff University in Wales, CEO emeritus of Spherix Incorporated in Rockville, Md., and principal investigator for the 1976 Viking Labeled Release experiment. The views expressed are his own.