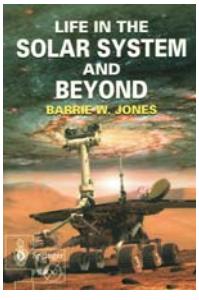
Our Once and Future Homes

Life in the Solar System and Beyond

Barrie W. Jones
Praxis/Springer-Verlag, New York, 2004. $39.95 paper (317 pp.). ISBN 1-85233-101-1

Reviewed by Charley Lineweaver

Don't be fooled by the title. *Life in the Solar System and Beyond* by Barrie Jones is not a work of popular science written by a journalist with a trendy interest in a hot topic. Jones is a professor of astronomy at the Open University, the United Kingdom's leading university dedicated to distance learning, and his new book is an undergraduate text aimed at the burgeoning number of students taking courses in astrobiology. His book covers the main themes of astrobiology and focuses on techniques to detect extrasolar planets. Bulging with concise explanations and 142 clarifying diagrams and photos, the book probably represents some of the best pedagogy in the solar system on these topics.



In this respect, *Life in the Solar System and Beyond* reminded me of Frank Shu's classic astronomy textbook *The Physical Universe: An Introduction to Astronomy* (University Science Books, 1982). Jones's book is written slightly above the level of a *Scientific American* article and slightly below the level of a professional review article—just the right level for most undergraduates. It successfully avoids the intimidation of hardcover compendiums of more established undergraduate courses and reads so well it can almost pass as a work of popular science. Open-minded scientists looking for an authoritative tour of astrobiology will enjoy the book; conservative scientists still wary of astrobiology's credentials may lose their suspicions in its pages.

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The author's summary of exoplanet detection techniques is excellent. He starts with the hardest topic: direct imaging in the infrared with coronagraphy and interferometry. He then moves on to astrometry, Doppler spectroscopy, transit photometry, and gravitational microlensing. Jones keeps us interested with simple explanations that don't get clogged up with jargon or bogged down with details that only a specialist would love. His approach is quite an achievement, because he ambitiously discusses externally dispersive interferometry, isoplanatic patches for direct imaging of exoplanets, point spread functions, side lobes, diffraction limits, and adaptive optics—all in the name of trying to track down and take a photo of our next home, another Earth.

My favorite section is Jones's clear explanation of how to interpret infrared spectra of planets. This topic is crucially important because such spectra will be the main tool used to infer the existence of life on a terrestrial planet, possibly within the next decade or two. His book contains concise explanations of almost everything under the Sun: how photolysis makes less massive planets lose their water; why the luminosity of the Sun increases with time, and how that leads to the faint early Sun paradox and to the evolution of the circumstellar habitable zone; and why the negative feedback loop of the silicate–carbonate cycle may be responsible for Earth's long-term thermal stability. He offers an articulate defense of the idea that low-mass stars (M-dwarfs) could harbor habitable planets. He artfully explains Graham Cairns-Smith's hypothesis of the mineral origin of life and offers a wonderful one-page summary of the *Viking* lander tests for life on the surface of Mars.

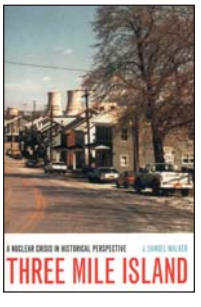
For instructors, Jones provides a summary of the most important points and a few well thought-out exercise questions at the end of each of the 13 chapters. Conveniently, answers to all of those questions can be found in the back. However, the book is not going to excite quasi-committed humanities students looking for more inspiration than facts. Jones is no Carl Sagan, conjuring awe with eloquence. Jones does not remind us of our anonymity, nor does he chastise us for our hubris. He makes no journalistic digressions into the human side of the search for exoplanets. In fact, he has bent over backward to keep humanity and (very regrettably) references out of the book. Some journalistically minded editor must have told him to remove all references to the professional literature, forcing Jones to write in the passive tense: "It has been estimated that . . ." and "There are estimates for. . . ." This book would be 5.36 times more valuable if references had been included to get ambitious students started in the professional literature. The list of texts and websites at the back of the book doesn't quite make up for it.

Jones gives the concepts center stage and rather soberly sticks to the scientific issues: how it is done, why it works, what the results of previous missions have been, and when the next instruments will come on line to detect other Earths. These issues are important. The fate of Homo sapiens may depend on our ability to control the size of an isoplanatic patch and find a new home—another Earth. Jones never comes close to such a melodramatic connection between technology and the hopes of humanity, but this idea lurks between the lines—somewhere.

Three Mile Island: A Nuclear Crisis in Historical Perspective

J. Samuel Walker
U. of Calif. Press, Berkeley, CA, 2004. $24.95 (303 pp.). ISBN 0-520-23940-7

As one would easily guess from its title, *Three Mile Island: A Nuclear Crisis in Historical Perspective* is about the highly publicized reactor accident in late March of 1979 at the Three Mile Island Nuclear Generating Station (often abbreviated "TMI") near Harrisburg, Pennsylvania. The author, J. Samuel Walker, is a professional historian employed by the US Nuclear Regulatory Commission (NRC).



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