

BOOK REVIEW

Origins—A Skeptic's Guide to the Creation of Life on Earth, by Robert Shapiro. New York Summit Books, 1986, 332 pp., \$17.95. Also in paperback—New York: Bantam Books, 1987, \$9.95.

Arguably, the existence of life on earth is the anomalous phenomenon par excellence: it indubitably exists even though it is implausible to the nth degree (if life were common in the universe, we ought to have known that by now from some of the places where it would have begun several billion years earlier than here). That is as though we had a reproducible parapsychological experiment, or a physical bit of an indubitable UFO, or a Nessie carcass: it would still remain to find a satisfactory way of connecting that datum with the corpus of scientific understanding. *Origins* illustrates how scientists flounder around in such a situation, where needed information is missing: believing that the connections exist, unwilling to leave them unknown for the time being, they build elaborate but conflicting hypotheses on little or no data and argue passionately over their relative merits. The unwarranted interpretation of doubtful evidence is as present here as it is in much of the literature on the evolution of *Homo sapiens*, on nutrition, on holistic medicine, or on what is commonly called fringe science or pseudo-science. But the media do not discriminate within science between what is properly scientific and what is not, and so some scientific myths can attain much currency: in this case, the myth that the earth initially had a strongly reducing atmosphere, that natural events would produce from that copious amounts of all the species needed for life, that only detail remains to be understood of the subsequent processes of intricate organization involved in the establishment of replication with sufficient (but not quite perfect) accuracy, of information transfer and specialization of systems, of cellular separation from the environment. Shapiro points to the lack of actual evidential support for the postulated sequence; more important and more useful, he shows in detail how the proponents' arguments are mere handwaving, and he makes plain what sort of information we will need to construct a realistic explanation.

Origins begins with exemplars of religious or mythological explanations on the one hand, of scientific on the other, and an excellent discussion of the nature of science and how it differs from mythology and religion. Then comes a well-organized summary of the chemistry of life on earth, and a survey of its history, followed by a revealing account of the Urey-Miller experiments which produced some amino-acids by sparking reduced gases.

There follows the useful chapter, "The Odds," and then attention is directed to the main issue, how a replicating system could originate and what its chemical nature could have been. Later come sections on extraterrestrial origins and on creationism. **Shapiro's** own guess is that structured clays played a role in the origin of life on earth, and that the first replicator was protein rather than nucleic acid; but the book is valuable for its analysis, not for any particular conclusions.

The controversies over extrasensory perception, UFOs, Nessies, and other **cryptobeasts**, etc., are intractably messy for a number of reasons: one is that argument over bits of data is incessantly fused and confused with argument over the plausibility of possible interpretations of such bits of data; another is the ever-present red herring, what is science and what is not? or, what is science and what is pseudo-science? This book is germane to both of those points.

To arguing over what is science and what is not, there is no end. There is no agreement in principle about what criteria are valid, and even the most plausible criteria often turn out to be ambiguous in application to specific instances. Shapiro emphasizes the distinction between myth, whose function it is to provide a sense of security by purveying certainty, and by contrast science, which can never legitimately claim a final and positive certainty. Throughout the book, this distinction is not merely asserted but applied and illustrated; moreover evenhandedly, as in the demonstrations that the "origins" theories of several scientists, though often enough published in scientific periodicals, are nevertheless myths and not science, no more true to facts than is the myth of the Scientific Creationists.

Shapiro has a fine gift for finding **analogies** that are illuminating and evocative, for instance in remarking that the Earth's history can be inferred from its mountains and sediments as **can** an individual's from his wrinkles and scars. Again, the manner in which the Scientific Creationists attempt to discredit science is **beautifully** and legitimately compared to an attempt to rewrite a specific and well-known bit of history. And subtleties having to do with probabilities are brilliantly explicated: Shapiro drives home the point that a few billion years is by no means long enough if the postulates are sufficiently unlikely, and he uses in a fresh and cogent way the old analogy of the typist monkeys set to produce bits of Shakespeare.

Primarily, of course, this book is an up-to-date and informed review of what we do not yet know about the presumed origin of life from inanimate precursors; there are incisive accounts of the competing schools of thought, and Shapiro ventures his own speculations as well as suggestions for **fruitful** lines of inquiry. Then too, as already said, it is an illuminating study of a dispute that has much in common with the disputes over anomalous phenomena. It makes clear at least one significant way that science differs **from** at least one category of non-science. It is exemplary in the inspired use of pedagogical analogy. And the whole is spiced by matter-of-fact comments

on the eccentricities of such well-known people as Fred Hoyle and H. J. Muller.

An earlier book by **Feinberg** and **Shapiro**, *Life Beyond Earth*, met very favorable critical response. This book is even better no more than once or twice a year do I come across a book as worth reading as this one. It affords pleasure in several ways, and it has special interest for those who struggle to make sense of anomalous phenomena.

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