
Book reviews

Küppers, B.-O.: Molecular Theory of Evolution. Outline of a Physico-Chemical Theory of the Origin of Life. Berlin Heidelberg New York: Springer 1983. ix + 321 pp., 76 figs. Hard bound \$ 31.60.

A. I. Oparin is generally credited with establishing the hypothesis that life appeared on the Earth as a result of the *evolution of molecules*. Although not the first to express this idea, Oparin set forth in substantial detail a scenario for the chemical and physical processes which he envisioned as being responsible for such an evolutionary process. Some biologists have remained sceptical of this concept, recognizing in the genetic mechanism a system capable of generating increasing levels of organization; a property which seems to be lacking in hypothetical, primitive precursors of living systems. Many find it difficult to understand how such complexity can arise out of "random" processes. The work of M. Eigen and his coworkers has, in recent years, demonstrated that evolutionary behavior is, indeed, a property of molecular systems. I. Prigogine and his associates have similarly shown that organization of a surprising kind can emerge from non-equilibrium systems.

In this book, Bernd-Olaf Küppers sets out to demonstrate how these developments have influenced thinking on the origins of life. The primary question to be answered is "What properties must a material system possess in order to organize itself, spontaneously and making use of selection?" The book

which results is an excellent introduction to the "hypercycle" model of Eigen and to contemporary ideas on the emergence of the genetic code. In spite of a truly terrifying amount of mathematics, the book can be read with profit by skipping over the math (part II can be eliminated entirely); the "flavor" of the arguments still comes through and can be appreciated by all. Those with the inclination and training can go back over the text to delve deeper into the mathematical support for the various conclusions which are drawn. I have only a few quarrels with the text. For example the statement (p. 257) that "Experiments have shown beyond reasonable doubt that under the conditions prevailing on the primordial earth . . . both nucleic acids and proteins could form spontaneously and independently of one another" would surely create gales of laughter in certain circles. Similarly the remark (p. 280) that ". . . spontaneous condensation of biological macromolecules from their chemical monomers leads to random sequences" is simply not accurate, and a fuller discussion of the claims of self-organizing tendencies in the co-condensation of amino acids by S. W. Fox and coworkers is certainly warranted. Still, these are not serious criticisms. In short, this is a worthwhile book to be read (or skimmed, as the case may be) by anyone interested in the problem of the origin of life, or concepts of molecular self-organization in general.

A. W. Schwartz, Nijmegen