Book Reviews

Scientific Detection

Life: Its Nature, Origin and Development. Aleksandr Ivanovich Oparin. Translated from the Russian by Ann Synge. Academic Press, New York, 1961. 207 pp. Illus. $4.50.

Life: Its Nature, Origin and Development is the latest of Oparin's books in which he treats, in mechanistic detail, the problems of life's beginnings. This book does not have numerical citations in the text, it contains few chemical equations, and it is otherwise written in a more popular style than Oparin's earlier volumes. (Also, it has no index.) The first edition of Oparin's *The Origin of Life on the Earth* was published in 1936, a second edition in 1941, and the third edition in 1957. The first edition beamed like a torch in the dark caves of ignorance and, for its time, outshone the later editions. Oparin's newest book, in a different style and with a different title, has recaptured some of the fresh vision and insight his 1936 book had.

The book is divided into chapters on the nature of life, the origin of life, the earliest period of the development of life, the further evolution of life, and a chapter entitled, "Conclusion." The states preceding life are now given by Oparin (page 95) as (i) an increase in complexity of organic substances, (ii) their polymerization, (iii) the organization of precellular forms (coacervate droplets), and (iv) the transformation of the latter into living things. In 1957, during a discussion at the First International Symposium on the Origin of Life on Earth, Oparin asked if life is merely a self-reproducing molecule or an entire multimolecular system. In this book, he clearly answers this and related questions in detail. On this particular question, Oparin favors the broader answer. In fact, the experimental work in his laboratory has focused mostly, or entirely, on the coacervate droplet as a precellular model, even though instability—for example, loss of form when centrifuged lightly—sharply distinguishes these units from the most primitive cells that we know.

Since 1936 biochemistry has come into its fullest flower. All of biochemistry and much of organic chemistry is indirectly related to the origin of the first organism. The problem may now be defined as one of selecting the "red thread" of events that were the actual order of processes preceding the first organism. A generally accepted minimal definition of the organism would also help to limit the range of controversy.

Although one may admire and honor Oparin's integrated thesis of the natural origin of life, he may also identify nuggets of thought which should ultimately confirm or deny Oparin's specific choice of the "red thread" of events.

Oparin speaks for a recapitulationist biochemistry in several places: for example (on pages 97 and 98) "these metabolic sequences are now carried out by the same combinations of chemical events which realized them many hundreds of millions of years ago"—but he specifically exempts protein synthesis from this relationship (page 63). This is not merely an inconsistency; it ignores the fact that amino acids are polymerizable, either biologically or chemically, by anhydride processes which are activated by phosphate. In yet other passages he rejects the total recapitulationist view of metabolic sequences (for example, on page 105).

The history of science is, to a marked degree, a history of the elimination of more or less firmly held preconceptions. In areas in which evidence is weakest, opinions are often strongest. Oparin holds some strong opinions, perhaps with the maximal justification that can be allowed for any one commentator. The requirement of organized systems for the synthesis of *ordered* protein molecules (page 67) does not comport with Pattee's recent theoretical conclusions derived from computer theory, nor with the experimental results of simple chemical copolymerization of amino acids by heating or by reaction of the Leuchs anhydride derivatives.

An almost lone touch of humor is found on page 161: "With the exception of the origin of Eve from the rib of Adam, as described in the Bible, we know of no case in which a person has reproduced himself vegetatively by simple division of the adult organism." In this book Oparin also uses the metaphor, "tree of life," with Biblical frequency.

On page 203 appears the statement: "any attempt at the direct, artificial reproduction or synthesis of even the simplest of living things must still be regarded as very naive." Perhaps, rather, such a preclusive negativism should itself be regarded as naive in 1961, when such scientists as H. J. Muller (using a definition of life that is unacceptable to Oparin) are willing to aver that the goal has already been accomplished. Although one should not anticipate laboratory synthesis of a cell within a few years, it would be ironic for such a cell to be produced as an indirect result of Oparin's intellectual stimulations; and it is often more unsafe to predict what will not occur than what will occur.

Alongside these and other provocative points, much pleasure and profit can be gained from reading the latest intellectual distillations of one who has devoted a major portion of his scientific life to the thesis that the matrix of life's beginning is understandable in chemical and physical detail.

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Radiation Protection

Strahlenschutz in Forschung und Praxis. vol. 1. Edited by Hans-Joachim Melching and others. Rombach, Freiburg, Germany, 1961. 245 pp. Illus.

Radiation protection has always been of special concern in Germany, and "Strahlenschutz-Richtlinien," based on research studies of the proper time period and on practical experience, were published early and systematically. Today radiation protection is well organized and controlled, not only by government officials, scientific committees, and institutions, but also by private organizations such as the "Vereinigung Deutscher Strahlenschutzärzte E. V."