

these are related to human disease. The converse type of situation is also explored, viz. where biochemical studies of disease have revealed genetic information (*e.g.* immunoglobulinopathies). "Biochemistry" is interpreted widely and the necessary orientating background information from other fields is included before a discussion of a potentially interesting growth point in biochemical genetics, *e.g.* leuco-agglutination techniques are described before discussion of leucocyte antigen genetics and chemistry.

There are some defects, *e.g.* alactasia and allied conditions are dismissed in an offhand manner, but this is no condemnation of the general pattern and could be rectified in a second edition.

The book contains 70 figures, 96 tables, 43 pages of author index and 25 pages of subject index. These statistics testify that the book is well illustrated, copiously stocked with tabulated facts and contains a large number of references.

It can be confidently recommended as a useful starting point for anyone wishing to enquire into a topic in human biochemical genetics or to gain a lead to basic information appertaining to a metabolic disorder with a significant genetic factor.

The cost of £9.80 will inhibit all but the most enthusiastic from possessing a private copy, but this book should be included in libraries in genetic departments, medical schools, hospitals and postgraduate medical centres.

D. A. PRICE EVANS

*Department of Medicine, University of Liverpool*

**MOLECULAR EVOLUTION AND THE ORIGIN OF LIFE.** By Sidney W. Fox and Klaus Dose. W. H. Freeman & Co., San Francisco. pp. 359+xi. £7.70.

This book deals with what is, in a sense, the most fundamental genetic problem of all, and the most inaccessible to study. A small number of experimentalists have, nevertheless, been working for many years to find out what chemical reactions *could* have occurred in the conditions which may reasonably be supposed to have prevailed on the primitive earth. Drs Fox and Dose have been prominent members of this undaunted band and are well qualified to review the field. Their critical summary will be obligatory reading for anyone interested in the origin of life.

Up to a point, the experimental results already available permit a plausible scenario to be constructed. In their earlier chapters the authors deal with the probable primaeval chemical and physical environment, and go on to summarise the evidence that heat, ultraviolet radiation or electrical discharges acting on simple materials such as methane, formaldehyde, ammonia and cyanide, could have resulted in the formation of many biologically significant compounds including most of the amino acid now found in proteins as well as purine and pyrimidine bases and porphyrins. Later chapters describe experiments on the formation of polymers from amino acids at elevated temperatures and the properties of the "microspheres" of protein-like material which may result under appropriate conditions; leading on (with something of a jump) to a discussion of pre-Cambrian fossils of undoubted living organisms. The suggestions that the proteinoid may possess feeble enzymic activities of various kinds (including, possibly, catalysis of further amino acid polymerisation) and that the layered surfaces

of proteinoid microspheres may exhibit semi-permeability make it possible to imagine how the primitive sticky mess could have led to a growing and dividing system, even before protein structure became encoded in nucleic acid. The "protein-first" hypothesis, which the authors support, certainly seems plausible.

Unfortunately, the transition from a rather indeterminate system of protein built on protein to the accurate self-reproduction, underwritten by nucleic acid, which is the essential characteristic of life as we know it, is hardly illuminated at all by laboratory experiments. One feels that this momentous development depended on a series of unlikely events such as could only be expected to occur given enormous amounts of material and unimaginable stretches of time. Such conditions were, of course, provided in the history of our planet, but they are not likely to be reproduced, or even realistically simulated, in the laboratory.

This being the case, the status of Prebiology as a science may be questioned. We may feel that it has more in common with the best Science Fiction—plausible extrapolation from the known to the unknowable, stimulating to the imagination but devoid of any possibility of verification. Its justification, which seems justification enough, is our incorrigible urge to speculate about origins and our need, if we are scientists, to make models which will be as consistent as possible with our verifiable knowledge even if they cannot themselves be verified. Fox and Dose's monograph can be recommended as an authoritative and continuously interesting account of the present state of this special scientific game, even though the rather heavy and sometimes opaque style does not always do justice to the terrifying immensity of the theme.

J. R. S. FINCHAM

*Department of Genetics, University of Leeds*

#### BOOKS RECEIVED

- CHALLENGING BIOLOGICAL PROBLEMS. DIRECTIONS TOWARD THEIR SOLUTION.  
Ed. by John A. Behnke. Oxford University Press, London, 1973. Pp. 502.
- THE THINKING MACHINE. John Brierley. Heinemann Ed. Books Ltd., London, 1973.  
Pp. 195. £2.50.
- THE CHALLENGE OF LIFE. BIOMEDICAL PROGRESS AND HUMAN VALUES. Ed. by  
Robert M. Kunz and Hans Fehr. Birkhauser Verlag, Switzerland, 1972. Pp. 456.