

bringing to the written account a welcome sense of interest and vitality.

Although the two volumes are available separately, the whole work is an expensive acquisition, but it must be recommended without reserve as a necessary companion for the researcher specialising in prostaglandins who wishes to keep abreast of recent developments across the whole field. It is perhaps less to be recommended to the biological scientist or student

seeking a survey of prostaglandinology, as there is little attempt either to review in a general manner or to draw together the different areas in which prostaglandins have biological relevance. Nevertheless, this up to the minute series should establish a place in the libraries of institutions interested in this exciting and fast developing area of clinically relevant research.

J. R. S. Hoult

Lymphocytes and their Interactions: Recent Observations. (Kroc Foundation Symposia Series Volume 4)

Edited by R. C. Williams, Jr.
Raven Press; New York, 1975
xi + 228 pages. \$12.50

There are several current books on the general theme of this volume; this one, like some of the others, is a transcript of a conference, and is partly concerned with basic immunology and partly with clinical studies. The complexity of cellular interactions in the immune response, however, leaves room enough for frequent colloquia and successive volumes and will no doubt continue to do so for some time.

The publication of any conference report raises difficulties for the editor. Firstly, there will usually be a substantial delay between the two events, and secondly, the reasons for holding a conference generally differ from those for publishing a book. The editor of this volume has dealt admirably with the first problem, for he has added a 16 page 'epilogue' which bridges the gap and which develops some themes raised earlier. The second problem has proved more difficult. Part of the purpose of a conference is to bring experts together and encourage their conversation. Whereas it may be tempting to put this discussion 'on the record' in practice it is often kinder not to do so. This is demonstrated in the first exchange after the first paper, when the speaker is tempted into claiming that the heavy chain of an immunoglobulin T molecule is 'slightly smaller than one micrometer' and indeed the verbatim transcripts of discussions which form about 15% of the book are marred by

the infelicities, ambiguities and irrelevances of casual discussion. There is a strong case for firm editing here, as is done, for example, with the CIBA series of symposia.

Papers written for a specialist audience can be of restricted interest, but in this volume a number of papers could tempt a more general readership. The first contribution, by Feldman, Erb and Kontiainen on cell collaboration in antibody production gives a summary of their views but the usefulness of this article to those not in the field is marred by the inaccuracy of the bibliography. The paper of most interest to biochemists is that by the Haddens and the Johnsons on cyclic nucleotides which is well written and argued and manages to include data on, for example, RNA polymerase that does not duplicate pre-existing publications, and in this case, the open discussion after the paper does bring out further useful points. The following articles, on surface immunoglobulin (Sell and Linthicum), role of accessory cells in the immune response (Mishell and Miller) and leucocyte migration factors (Weisbart) are all useful but for their exposition of immunological rather than biochemical ideas. The second section of the book is concerned with clinical studies, primarily autoimmunity and malignancy (Talal and others), immunocompetence and surveillance (Wybran and Fudenberg),

lymphocyte markers as a probe in disease (Strickland and others), immunosuppression (Yu and others) and antilymphocytic antibodies (Messner; Kunkel and others). To biochemists, these topics perhaps represent fields to keep an eye on for future considera-

tion rather than immediate inclusion in the mainstream of the discipline.

D. S. O'Dell

Protein-Metal Interactions

Edited by Mendel Friedman
Plenum Press Inc.; New York and London, 1974
x + 692 pages. £24.89, \$ 47.40

Over the past decade studies on the rôle of metal ions in biological systems have benefitted from the increasing application of sophisticated physico-chemical techniques to biological problems. Protein-metal interactions have been a particular beneficiary of this development and, in consequence, new information has accumulated at a rapid rate. It is, therefore, inevitable that several treatises devoted to this topic have appeared recently, including *Inorganic Biochemistry* (edited by G. Eichhorn), and *Volume 5 of The Proteins*, which is devoted entirely to a discussion of metalloproteins. The book reviewed here contains the proceedings of a symposium organised by Dr Friedman for the Division of Agricultural and Food Chemistry of the American Chemical Society and held in Chicago in August, 1973. It consists of 22 articles derived from the symposium presentations, together with an additional five invited contributions. In general, the articles are longer and more detailed than would be expected for reports of symposium proceedings, but no record was apparently kept of discussions involving the participants and/or the audience. The published proceedings, therefore, read more like a multi-author volume of specialised reviews on aspects of protein-metal interactions and lack the insights which can be gained by incisive and directed discussion between workers having a wide spectrum of interests centered around the general topic of the symposium. Thus, while the symposium itself may have fulfilled Dr Friedman's objective of generation of new ideas

and approaches by such cross-fertilisation, no trace of this aspect remains in the resulting publication.

It is difficult to detect any overriding theme within the area of protein-metal interactions which links the constituent articles in this book, although one does note that 12 of the contributions emanate in toto or in part from the laboratories of the US Agricultural Research Service, and that three of these are co-authored by Dr Friedman himself. However, in a very general way one can discern three topic groups. Ten of the articles describe studies on the interaction of purified proteins with ligands, using more or less sophisticated physicochemical techniques. These contributions include an article or articles on the rôle of metals in metallo-enzymes (Vallee) which appears to be an obligatory feature of such symposia; on the interaction of ligands with metalloproteins, e.g. $^{13}\text{CO}_2$ with haemoglobin and carbonic anhydrase (Gurd), anions with transferrin (Aisen) and esters with carboxypeptidase A (Kaiser); and on the interaction of metals with proteins, e.g. Ca^{2+} with elastin (Rucker), with carp muscle binding proteins (Bradshaw) or with antibody-antigen complexes (Maurer), and transition metal ions with lactoferrin (Brown). Allied with this group are the three articles which consider applications of new techniques to studies on protein-metal interactions, including X-ray photoelectron and energy dispersive fluorescence spectroscopy.

A second group of three articles, which are the most interesting to this reviewer, consider the biological rôle of some metallo-enzymes, including the oxidases and reductases involved in iron metabolism (Frieden) and the oxidases implicated in cross-linking of collagen (O'Dell). Also in this group is an article by Frieden on the evolution of metal ions as essential elements, which contains some very interesting ideas, especially in regard to the relationship between copper and iron. Since these topics are seldom treated in any detail in discussions of metallo-enzymes or metalloproteins, their inclusion is a welcome feature of this volume.