

of biological specimens, and microbiologists for information on metallurgical techniques. A glance at the table of contents will show, however, that those pages useless to either type of microscopist comprise less than a quarter of the whole, so that this particular compendium of articles appears to be well justified.

The second edition differs from the first chiefly by the addition of an article by Howie on the interpretation of micrographs of thin crystals. This article is the best short account of the subject now available. Some of the other articles do not reconcile so well the conflicting roles of elementary exposition of theory and up to date description of advanced techniques. This difficulty could be alleviated to some extent by the inclusion of a list of standard books in which the interested reader can find treatments of the various theoretical topics at a suitable level. (I have in mind such topics as the scattering of electrons by atoms, general principles of diffraction, etc.)

A casual reading of the book reveals very few errors. The book is also quite up to date, although inevitably some recent developments (particularly those concerning ancillary apparatus and special attachments) are not included. A casual reading also reveals those areas in which further technical advances would be most welcome; in the measurement of magnification, for example.

The book is certainly essential for any laboratory using electron microscopy. It is an extremely good introduction to experimental techniques for research students, and for other research workers trying unfamiliar methods.

L. M. BROWN

CARBANIONS

Carbanions in Synthesis

(Oldbourne Chemistry Series.) By D. C. Ayres. Pp. viii + 207. (London: Oldbourne Press, 1966.) 52s. board; 25s. limp.

CLEARLY, a considerable degree of condensation and compression is required to deal with such a far-ranging topic as the role of carbanions in synthesis in a book of 207 pages. This is most noticeable in the first main chapter of *Carbanions in Synthesis*—forty-two pages on the formation, stereochemistry and reactions of the metal alkyls—in which the selection of the material covered seems a trifle capricious, to say the least. In the section entitled "Stereochemistry of Metal Alkyls", for example, the only stereoisomers of metal alkyls mentioned are the optical isomers of substituted cyclopropyl derivatives of lithium and magnesium; there is no reference at all to the widely investigated secondary butyl compounds of mercury, although work on these latter compounds has led to a much better understanding of mechanisms of reaction in organometallic chemistry.

The succeeding chapters, 152 pages, making up the bulk of the book, form a somewhat separate section or classical organic syntheses. Here Dr. Ayres seems to be much more at ease, and deals convincingly with established topics such as the synthetic uses of acetylides, malonic esters, diazomethane, and the various carbonyl condensation reactions, as well as with more recent developments in the form of the Wittig reaction, arynes, carbenes, and so forth.

Reaction mechanisms are considered wherever appropriate and, indeed, help to unify the treatment on the "carbanion" theme. As illustrations of the various general reactions and methods, specific examples, often from natural product chemistry, are invariably quoted, and each chapter ends with a useful selection of problems together with the original sources of the problems. Second-year and third-year undergraduates should find the book, in general, both interesting and informative.

M. H. ABRAHAM

ALGORITHMS

Introduction to Cybernetics

By Viktor M. Glushkov. Translated by Scripta Technica, Inc. Translation edited by George M. Kranc. Pp. x + 322. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1966.) 94s.

THIS book is really an introduction, not to cybernetics as it is known in the West, but to the theory of algorithms. As such it covers mathematical logic, from the propositional calculus to the Gentzen formalization of the predicate calculus and the decision problems, Post, Turing and Markov algorithms, Boolean algebra, switchings nets, and the elementary theory of finite sequential automata, and some aspects of the theory of self-organizing or self-improving systems. There is also a chapter on Algol programming, as an example of a universal language for representing algorithms on a general-purpose digital computer.

In general, this is not a book which is suitable for the uninitiated. Most of the chapters are too concise, and there are not nearly enough examples to work through. The sections dealing with Boolean algebra applied to switching nets, and the theory of finite automata, leave much to be desired. There is no treatment of threshold logic, which has so many applications in the construction of actual automata, nor of the algebra of finite automata, centred around the Rabin-Scott/Schutzenger introduction of finite semi-groups and the subsequent Kron-Rhodes canonical decomposition theory.

The book is, however, well worth reading for its main chapter—that dealing with self-organizing systems. The well known Perceptron is analysed in detail, and it is clearly shown that there are severe disadvantages in the use of randomly connected nets for pattern recognition, even if there is an external trainer. It is also shown that if there is no external trainer, the Perceptron is the least likely automaton to achieve correct pattern recognition. In this respect this volume will be useful to those interested in artificial intelligence, but not necessarily to those interested in the wider aspects of control and communication in animals and machines.

J. D. COWAN

Engineering Materials

Selection and Value Analysis. Edited by H. J. Sharp. Pp. 428. (London: Heywood Books, for Iliffe Books, Ltd.; New York: American Elsevier Publishing Company, Inc., 1966.) 85s. net.

THIS book is intended to serve two purposes: it provides, for the benefit of designers and materials engineers, a concise body of factual information about the properties of commercially available constructional materials, and it also seeks to expound the philosophy of "value analysis" applied to materials selection as a means of finding the cheapest material to fulfil a precisely defined function adequately. The first purpose is served better than the second; nevertheless, the importance of economic considerations is emphasized throughout the book, and information on comparative costs is listed in many places.

The chapters on various categories of materials are uneven in quality. The best is that by P. C. Thornton on constructional steels, which can serve not only as a useful source of data, but also as a lucid primer on the principles of selection and heat treatment of steels. Several other metallurgical topics, such as bearing alloys, are also well treated, and indeed the book has a strong metallurgical bias, in spite of the fact that the editor contributes a useful summary of the properties of modern plastics. The editor also contributes a critical survey of materials processing methods. Engineering ceramics and glasses and composites (other than fibreglass) receive no attention.