

machine language pertaining to a particular machine, but the increasing importance of autocoding to the user is emphasized and illustrated by applying FORTRAN to a few simple numerical problems. The final chapter describes some important applications of computers, particularly their use in non-numerical fields.

Automatic Digital Calculators would be a useful acquisition as an introductory text to the serious student of computer science and as a source of reference to the interested computer user. The extensive bibliography would be invaluable.

JAMES FULTON

Anwendungen der Kernmagnetischen Resonanz in der Organischen Chemie

Von Harald Suhr. (Organische Chemie in Einzeldarstellungen, Band 8.) Pp. viii + 424. (Berlin and New York: Springer-Verlag, 1965.) 68 D.M.

AFTER the publication around 1960 of a number of books on the application of nuclear magnetic resonance in organic chemistry, a comparative lull fostered the fear that nobody again would undertake the ever growing task of surveying this rapidly expanding field. Fortunately, a new generation of books is now appearing. One of these is the present volume, which will be found useful from two points of view—as an introduction to the principles and potentialities of the method and as a survey of the literature giving extensive data on various types of systems.

The first four chapters deal with the general physical principles, the measurement and origin of chemical shifts, the phenomenon of spin-spin coupling and with time-dependent effects. These chapters provide a very clear but essentially qualitative introduction. The longest chapter in the book (171 pages) is an extensive survey of the proton resonances of various types of organic and organometallic compounds, well documented with tables, charts, spectra and literature references.

The main emphasis is on relatively simple systems; applications to natural product chemistry are discussed only briefly. There is a useful chapter on nuclei other than the proton (boron, carbon, nitrogen, oxygen, fluorine and phosphorus), and the final chapter covers a number of special topics, including quantitative analysis, solvent effects, double resonance, conformational analysis and the investigation of electrolyte solutions.

The author has been successful in providing both a readable introduction and a useful reference work and, although sometimes he does not probe very deeply below the surface, this is a valuable book.

P. SCHWARZ

Infrared Band Handbook

Supplements 3 and 4. Edited by Herman A. Szymanski. Pp. 261. (New York: Plenum Press, 1966.) \$15.

Handbook of Fluorescence Spectra of Aromatic Molecules

By Isadore B. Berlman. Pp. viii + 258. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1965.) 68s.

SUPPLEMENTS 3 and 4 of Szymanski's *Infrared Band Handbook* follow the pattern of earlier volumes, with a frequency range of 100–4,000 cm⁻¹. Entries are arranged in order of individual band positions, indicating intensity, structural group vibrational assignment in many cases, as well as the physical state of the compound. The present volumes, which are bound within a single book, cover some 400 compounds taken from the literature of 1962–64 and bring the total number of bands covered in the *Handbook* and its supplements to 18,000.

The *Handbook of Fluorescence Spectra of Aromatic Molecules* collects the spectra of approximately 100 aromatic molecules, all of which have been measured at the Argonne National Laboratory. Fluorescence and absorption spectra are plotted for each molecule. In addition relevant data about the fluorescence process are

included on the diagram. This includes the fluorescence decay time, the fluorescence quantum yield, the computed natural life time, the Stokes loss and the average wavelength of the fluorescence spectrum. The choice of molecules is somewhat arbitrary, though a special effort has been made to include organic scintillators of current interest. The appendixes include conversion tables of wave numbers, wavelengths, electron volts and Rydberg units, running from 2000–6000 Å. A useful introductory chapter covers methods of measurement and evaluation of results.

D. J. MILLEN

Patterns of Mammalian Reproduction

By S. A. Asdell. Second edition. Pp. viii + 670. (London: Constable and Co., Ltd., 1965.) 84s.

IN 1946, S. A. Asdell, professor of animal physiology in Cornell University, published the first edition of his *Patterns of Mammalian Reproduction*. In it he assembled, with great critical skill, such information as was worth recording about the sexual physiology of mammals. He concentrated on the most important studies of each species, and particularly on those which constituted precise and quantitative knowledge.

The second edition is some 200 pages longer than its predecessor, and brings the subject up to date. Dr. Asdell brings into his review all the better papers on the subject which have been published over the past eighteen years, and has wisely eschewed "snippets" which would not have added materially to a most valuable and easy work of reference. It and the third edition of *Marshall's Physiology of Reproduction*, which is curiously never referred to in the bibliography, will provide effective guidelines for years ahead to a new generation of students of mammalian reproductive physiology.

Echinoderms

By David Nichols. Second impression (revised edition). (Hutchinson University Library.) Pp. 200. (London: Hutchinson and Co. (Publishers), Ltd., 1966.) 10s. 6d. net.

THE echinoderms have been neglected for fifty years. The few people who now study them, however, are conscious that interest is reviving, and the next decade will see much activity and many surprises. Echinoderms are, after all, of great intrinsic interest—what other group can show three nervous systems, three superimposed symmetries and three or more coelomic systems in the same animal? In addition, at least in my opinion, they are very closely related to the vertebrates.

Dr. Nichols's little book makes an excellent introduction to echinoderms. It describes the five extant classes, not omitting their fossil members, and also deals with the extinct classes, as well as discussing more general matters like pentamery and the twilight world of interphyletic relationships.

As compared with the first edition, changes are few. The asteroid chapter has been revised according to Fell's work. A short description of Durham and Caster's new class, the Helicoplacoidea, is given. The cornute and mitrate carapoids are re-oriented according to Prof. Ubahgs's surprising interpretation.

Some minor slips, almost unavoidable in a work of this sort, should be mentioned. Thus, the ophiocystioids are first known from the Ordovician, as stated on p. 160, not from the Silurian, as implied on p. 71. The first known edriasteroid—*Stromatocystites walcottii* Schuchert—is Lower, not Middle, Cambrian in age. The pectinirhomb (Fig. 18g), with thin-walled saes outside it, is converse to the accepted interpretation, and most unlikely. The least satisfactory chapter in the book is that on lesser known Palaeozoic forms, precisely because present knowledge is so scrappy.

This book is a lucid introduction to a difficult subject and deserves continued success.

R. P. S. JEFFERIES