this nature. Nevertheless, the authors have skillfully collected together the modern trends developing in this subject. Much of the review is of a highly mathematical nature, particularly in the discussion of power series expansions of the potential and of Padé approximants to these series. However, the authors do not neglect the qualitative aspects of diatomic interaction theory, and present an excellent discussion on the virial theorem and the way in which it can be used to determine the range of validity of widely used potential functions. The qualitative implications of the Hellmann–Feynman theorem are also well discussed. The review is at its most pedagogic in its treatment of the momentum space approach to diatomic interactions, carefully introducing the concept of the momentum wavefunction and momentum density and its relation to the Compton profile before dealing with more modern work on the relation between diatomic interactions and the momentum distribution.

Chapter 3, by J.-L. Calais, deals with the problem of the treatment of electron correlation in extended systems, where conventional methods such as configuration interaction are not appropriate. The chapter presents an alternative approach to electron correlation based on a single determinant wavefunction with no restrictions on the spin orbitals. Unfortunately the article does not attempt to review the history of the method or to give a detailed account of the concepts employed, but merely seeks to stress the utility of an approach which has yet to be fully exploited in the chemistry of extended systems. Because of the brevity of the treatment, a good deal of background knowledge is assumed on the part of the reader, particularly in the areas of general Hartree–Fock theory and of group theory.

Chapter 4 presents a timely review of electrically conducting polymers by K. Tanaka and T. Yanabe. Much of the article is concerned with polyacetylene and discusses, amongst other things, the influence of perturbations, such as doping, on the electronic structure, and the soliton model of electrical conductivity in polymers. Finally, the last chapter, by the series editor P.-O. Löwdin, deals with aspects of quantal statistics and the solutions of the Liouville equation for systems in thermal equilibrium at finite temperature.

The book is well produced and remarkably free of errors, and maintains the tradition of the series in providing informative and timely reviews in major areas of theoretical chemistry.

B. H. WELLS

Higher Excited States of Polyatomic Molecules, Vol. III

by M. B. Robin; published by Academic Press, Orlando, FL, 1985; 488 pp.; price $49.50/£49.50; ISBN 0-12-589903-3

Covering the period from 1974 - 1985, Vol. III is a supplement to Vols. I and II rather than a revised edition. The author has provided the book with an excellent preface on which I shall draw heavily in the following review.

20 broad classes of chromophoric systems ranging from the alkanes to biological molecules are covered with frequent appropriate references to Vols. I and II. Attention is focused on excitations beyond 50 000 cm^{-1} (6.2 eV) in molecules containing four or more atoms. The 50 000 cm^{-1} limit is a natural barrier between the much-studied and well-understood valence transitions ($n \rightarrow \pi^*$, $\pi \rightarrow \pi^*$, d → d, ligand → metal etc.) and the higher excited states involving both Rydberg excitations and those to σ^* molecular orbitals about which there is so much confusion. The goals pursued are (i) to assign the various transitions on the basis of their orbital characteristics and (ii) to demonstrate the relatedness of transitions in otherwise unrelated systems. This work thus contains thorough compilations of spectroscopic data. It then goes beyond the literature in an attempt at the synthesis of a coherent explanation of what is found there.

The usefulness of the monograph is enhanced by the definition of terms (Chapter I is "A Catalog of Orbitals and Excitations in Polyatomic Molecules") and by the discussion of general aspects of the newer experimental techniques (Chapter II is "New Sources of Spectral Information"). Another valuable source of spectral information, *ab initio* calculations, is exploited widely by the author. Such computations are found to be especially useful in assigning the components of Rydberg transitions and in assessing the mixing of Rydberg and valence transitions.

I highly recommend this monograph, as well as Vols. I and II, to all research workers interested in its title field.

GEORGE R. DE MARÉ

Primary Photoprocesses in Biology and Medicine

by R. V. Bensasson, G. Jori, E. J. Land and T. G. Truscott; Plenum, 1985; 478 pp.; price, $85.00; ISBN 0-306-41930-0

This volume gives the proceedings of the NATO Advanced Study Institute held in September 16 - 28, 1984, in Bressanone, Italy.

Although approximately one third of the 65 lectures reproduced cover topics in photobiology, they are largely limited to photodamage in mammalian tissue. The emphasis in this NATO meeting, however, was laid firmly on primary photoprocesses and techniques for their elucidation, so the book will be of considerable interest to experimentalists across the whole range of photobiology. For those directly involved in research related to photomedicine, it comes as a timely and comprehensive review of recently developed techniques for the study of short-lived species involved in current and potentially useful phototherapy and photochemotherapy.

The lectures comprise a series of overviews of each field interspersed by shorter contributions on recent results on particular aspects of the field. The first part covers a wide range of time-resolved techniques available for the study of transient species, including flash photolysis, pulse radiolysis,