hence the famous Wigner theorem on the realization of symmetries by linear or antilinear transformations appears here in relation to the fundamental theorem of projective geometry, in the formulation of Artin. Even if Jauch sketches in all the required mathematics, from the structure of topological groups to the Bargmann–Wigner theory of projective representations, at this level of abstraction these chapters are rather hard. For the further development on the dynamical behaviour of physical quantum systems and the measurement process, the standard Hilbert space realization is drawn on. Only conservative situations are considered in detail and the existence of the Hamiltonian is inferred from the existence of automorphisms of the quantum lattice of questions which are continuous in time. Jauch offers an original version of measurement theory designed to obviate that seemingly infinite regression where the "cut" between observer and object of measurement is displaced so that finally the "consciousness of the observer" appears as a kind of last court of appeal. This is done by an axiomatic restriction of suitable measuring apparatus, which covers classical systems, but also subsumes a class of quantal systems. The restriction is by no means obvious and I, like Rosenfeld, share some of the doubts expressed about this procedure. Jauch's formulation does at least have the merit of excluding consciousness from the realm of quantum mechanics and "Wigner's friend" loses his paradoxical status. The other paradoxes are given their due, in somewhat conventional terms.

The remaining four chapters, forming part three, which can really be read independently of the rest, are an extremely elegant and economical version of the conventional quantum mechanics of elementary particles. This is based on localizability and the homogeneity and isotropy of space and is a joy to read.

Even if one does not entirely share the enthusiasm of the author for axiomatization as the best way to deal with questions of consistency in quantum mechanics, one will readily grant him that as an example of abstract presentation of pure theory his book is a masterpiece. That non-relativistic quantum mechanics admits of such a formulation, although Jauch does not quite succeed in laying bare the empirical grounds for the mysterious use of complex numbers, is itself reason for congratulation. It is perhaps fortunate for physical theory in general that the range of application of the non-relativistic theory has its well understood limits!

S. Zienau

COMPUTERS AND CHEMISTS

The Computer and Chemistry

An Introduction to Programming and Numerical Methods. By T. R. Dickson. Pp. 216. (Freeman: San Francisco and London, November 1968.) 48*s*.

This is a very well written and carefully compiled book; it has been written in two parts. In part one the author presents a very brief introduction to digital computers, computer languages and flow charting. The remainder of part one is devoted to a description of the FORTRAN language. Because there are now many FORTRAN dialects, the author has chosen to present FORTRAN II and FORTRAN IV, taking great care, at the appropriate points, to indicate where these differ. Not all, but most, of the features of the language have been included, a sensible subset having been selected which should certainly satisfy the needs of most programmers. It should, of course, be pointed out, as the author does, that anyone preparing a program for a specific computer should check on his local FORTRAN dialect before becoming too involved in detailed coding. None the less, this section gives an extremely lucid account of the language and provides a very readable text for the beginner.

The second part of the book accomplishes two functions; on the one hand, it provides a useful survey of the various parts of chemistry where computation may be successfully applied, and, on the other, it gives sufficient detail about many topics to provide a useful reference text for programmers with specific interests. Entitled "Numerical Methods and Computer Applications" the subjects covered are program writing, data manipulation and function evaluation, finding roots of equations, numerical integration, matrix manipulation and solution of simultaneous linear equations, curve fitting, eigenvalues and eigenvectors. Each chapter contains an adequate theoretical discussion of the subject matter and has relevant sections of program in FORTRAN together with specimen data and results. This ensures that the student not only appreciates the theory lying behind his problem, but also that he can readily produce a program and has ready-made data and results to use for testing it. Also included in each chapter are additional problems suggested as student programs.

My only regrets about this book are that the initial introduction is so brief, and that the language presented is FORTRAN and not ALGOL, which is more widely used in this country than it is in America. The author's purpose of providing a solid introduction to computer programming and numerical methods for undergraduate chemistry students has been admirably achieved.

J. G. Sime

ORGANIC GEOCHEMISTRY

Geochemistry of Organic Substances

By S. M. Manskaya and T. V. Drozdova. Translated and edited by Leonard Shapiro and Irving A. Breger. (International Series of Monographs in Earth Sciences, Vol. 28.) Pp. xxiv + 347. (Pergamon: Oxford, London and New York, October 1968.) 140*s*.

The past fifteen years have seen a rapid expansion in organic geochemistry. To begin with, the petroleum companies were chiefly concerned, but now it involves coal industries, universities and research institutes. At present most of the available organic geochemical texts are compilations of the proceedings of meetings. Until the publication of the translated Russian text, *Geochemistry of Organic Substances*, only one book[1] in the English language was wholly devoted to a deliberate synthesis of organic geochemical knowledge, and even in this instance individual chapters were written by different authors. Although E. Degens[2] in his book on low-temperature geochemistry gave an extensive survey of organic geochemistry, Manskaya and Drozdova are the first authors to attempt to write a complete monograph on the subject.

Whereas the book with many contributors achieves a wide coverage, but often lacks an integrated theme and a uniform style, a book by one or two authors may be heavily weighted towards the research interests of the writers. This pitfall has unfortunately not been avoided by Manskaya and Drozdova. The book begins slightly unconventionally with a preamble that includes a preface, a short survey entitled "Organic Substances in Geochemistry" by A. P. Vinogradov and then a brief introduction. The initial twenty-five pages of the main text consider the classification and structure of organic compounds which may reach sediments and which are later converted to fossil organic materials by diagenetic and post-diagenetic processes. More than one third of the book is then devoted to the origin, nature and formation of organic substances in peat and coal, and virtually all the remaining text, apart from some twenty pages, is concerned with the concentration of metals by organic