with which the authors have been closely associated. For this reason, perhaps, the chapter is particularly comprehensively written, with details not only of relevant crystal field theory and the spin-lattice interaction, but also of such relatively esoteric topics as rotatory dispersion and the phonon maser.

The amplification of ultrasound that can take place in some semiconductors is also treated in detail, with a useful discussion of non-linear and acousto-electric effects. Metals are mentioned only very briefly, on the questionable grounds that this is a low frequency topic. Mechanisms of ultrasonic attenuation by electrons are summarized and referenced, including those present in superconductors. The final chapter reviews the interaction of light with microwave ultrasound as studied by the techniques of Brillouin and stimulated Brillouin scattering. There are several useful appendices, mainly of crystal matrices and coefficients. Inevitably, certain sections of the book are already out of date, and the references are complete only up to 1970.

The book has been written at the first or second year graduate level and the mathematical formalism is presented in a clear and helpful manner. It is perhaps fashionable to criticize the price of books; nevertheless the figure of £17 cannot be allowed to pass without comment, because it is likely that those for whom the book is intended will not be able to afford it.

J. K. WIGMORE

Non-magnetic Metals

Introduction to the Theory of Normal Metals. By A. A. Abrikosov. Translated by Alex Baratoff. Pp. xi+293. (Academic: New York and London, 1972.)

AS is apparent from the title, unlike

other supplements to *Solid State Physics*¹, this is not a scholarly treatise on a specialist topic. Rather, it is a very unusual introductory text to the theory of non-magnetic and non-superconducting metals. Roughly speaking, it consists of a rapid sequence of "order of magnitude" calculations pertaining to the physics of normal metals.

Conventional topics like energy bands, Fermi liquid theory and scattering processes which give rise to resistance are quickly disposed of in the first four chapters. The rest of the book, ten more chapters, is devoted to problems which only recently have been explored in any detail. Many of these, like the various size effects, helicon waves, magneto plasma waves and Fermi liquid effects, are not yet part of standard texts on metal physics.

The calculations are short—the discussion is kept to a minimum—they are frequently novel, and always instructive. Using only the most elementary means, Schrödinger's equation, Boltzmann equation, and so on, the author contrives to make first principle calculations of such complicated effects as the giant oscillations in ultrasonic attenuation and the like, always including sufficient detail to enable the reader to follow each mathematical step. At the end of each calculation numerical estimates are given of the absolute magnitude of the effect.

There is no attempt at rigour. The aim is always to isolate the main contribution and to exhibit why the effect is interesting from the point of view of the basic interactions. On this level the book is an intellectual *tour de force*.

As the author warns the reader in the preface, the topics covered reflect his research interests. These are largely that of a many-body theorist and show up to an adverse effect in the rather misleading summary of the current state of band theory in chapter 14.

Nevertheless, it should make an interesting and an edifying reading for any solid state physicist, experimentalists and theorists alike. It should also be useful as a text in a more specialized course on metal physics for postgraduate students or as an outside reading for honours students doing solid state physics.

B. L. GYORFFY

¹ Ehrenreich, H., Seitz, F., and Turnbull, D. (eds), *Solid State Physics* (Academic Press: New York and London).

Angle on Aromaticity

The Aromatic Sextet. By Eric Clar. Pp. x+128. (John Wiley: London and New York, December 1972.) £1.50.

THREE groups of people should buy a copy of this book. Anyone who works with polynuclear systems will find in its pages an astonishing amount of factual detail; any theoretical chemist interested in electronic spectra or aromatic molecules should buy a copy and find a life's work of unsolved problems; anyone who knows Clar, or who has ever worked with him, will find here the familiar uncompromising interpretations of the experimental results which he has so indefatigably compiled.

Yet there will be few undergraduate courses that will adopt it, because so much of the theory in it offends against the accepted framework of bonding and aromaticity which all chemists (except Clar) subscribe to. Is he a latter-day Copernicus, and are we all wrong?

Clar considers the familiar circle inside the formula for benzene as an almost inseparable set of six electrons—Robinson's aromatic sextet. In naphthalene therefore only one ring at a time can be truly benzenoid (containing a sextet)—the other ring only possesses four π electrons! Anthracene likewise can only have one ring benzenoid at a time, whereas phenanthrene can have two benzenoid rings, leaving the 9,10 bridge with a localized double bond.

Clar goes on to treat more complex hydrocarbons in the same rigorous way, counting the number of rings which can simultaneously contain the magical aromatic sextet. When this is done, he can offer rationalizations of bond localization, chemical shift values, coupling constants, reactivity, and electronic spectra. These empirical computations might be christened "Clar's rules" to take their place with the Woodward rules of ultraviolet, or the Shoolery rules of nuclear magnetic resonance spectra.

What is needed for the moderates among us is a companion volume written from the standpoint of theoretical orthodoxy—but which is equally successful in explaining the facts. To my knowledge this will be a long time in coming.

WILLIAM KEMP

Ostracods in Stereo

Ostracod shells from *A Stereo-Atlas of Ostracod Shells*, by P. C. Sylvester-Bradley and David J. Siveter (Department of Geology, University of Leicester, 1973). The atlas is designed specifically to meet the needs of palaeontology, in which the study of fossils is strictly descriptive rather than interpretative.