between root and shoot meristems are skilfully outlined as are considerations of differentiation of the plant as a whole. The origin and development of vascular elements, the special types of cells of which they are composed, and the role of hormones and sugars in their initiation are given considerable space. Two important chapters cover the formation and function of the cambium and the final chapter deals with totipotency and regeneration.

Throughout the book the question, "How do all these cell types differentiate in a coordinated way to produce the integrated, functionally efficient organism?" is presented and expanded in a particularly lucid and interesting way. The experiments described are well chosen to illustrate questions in plant development rather than to provide answers that are yet in doubt. The chapters on embryogenesis, the shoot apex and the origin of leaf and bud primordia are excellent examples of this approach. Now that there is already so much for the scientist to read, these authors must be congratulated on providing a valuable book that cannot fail to stimulate thought in students and research workers and arouse the interest of all those who work with plants.

DAPHNE J. OSBORNE

Quantum Mechanics

Quantum Mechanics: Principles and Formalism. By R. McWeeny. (*The International Encyclopaedia of Physical Chemistry and Chemical Physics. Topic 2. Classical and Quantum Mechanics Vol 1.*) Pp. xi+155. (Pergamon: Oxford and New York, 1972.) £3.50.

ANOTHER "Introduction to Quantum Mechanics"? One's worst fears are aroused, for surely there are already quite enough of these. But Professor McWeeny's book justifies itself, and one's preliminary fears are not realized. First, as the author says, this is not an introduction, for the basic ideas of the quantum theory are assumed: it represents a revision course, with the opportunities that any revision course provides to give a more consistent account than is possible when the material is first being introduced to the student. Second, although its scope is limited (no one should try to say everything in 150 pages), it is definitely oriented towards the budding theoretical chemist rather than the theoretical physicist or applied mathematician; and to that extent it is not in competition with many other accounts of quantum theory.

Professor McWeeny writes as a master of his subject, with considerable form and control. He also writes well, so that this book is a pleasure to read. Its compass is limited, and we are told that it is to be the first of a sequence of four volumes dealing with the principles and techniques of quantum mechanics. With such a writer it would surely have been far better to let him write one large volume. The result would have been cheaper (this whole encyclopaedia is far too expensive for the very people it best serves): and he should not have had to stop short after an admirable account of transformation theory, momentum representation, single-particle spin, and the properties of linear operators in Hilbert space, waiting for successive volumes to deal with perturbation theory, group theory, many-body theory and scattering theory. Within the "brief" that he was given Professor McWeeny has done a splendid job: but the brief was not big enough.

C. A. COULSON

Metal Pi-Complexes

Metal Pi-Complexes. By Max Herberhold. Volume 2. *Complexes with Mono-Olefinic Ligands.* Part 1. *General Survey.* Pp. xv+643. (Elsevier: Amsterdam, London and New York, 1972.) Dfl. 250; $78.25.

THE author of this volume comes from a laboratory famous for its work on metal π-complexes—the Technische Universität, Munich. This present volume, Part 1, deals with the history of the subject and the earlier views on bonding; general methods of preparation follow. The main body of the text is devoted to a detailed systematic survey of mono-olefinic complexes. The main emphasis is placed on preparative aspects, but physico-chemical properties are quoted wherever necessary for an understanding of the structure. The olefins have been subdivided into hydrocarbons, for example, ethylene, and those possessing functional groups, for example, acrylonitrile. Spectroscopic and diffraction data, stability constants, current views on metal olefine bonding and uses in homogeneous catalysis, are promised for the second part.

The present volume includes the literature up to the end of 1968 (an appendix gives abstracts of 210 important papers which appeared during 1969 and 1970). I sympathize with the difficulties experienced in the writing and production of such a volume, but potential purchasers ought to know that the systematic literature survey ended about three and a half years ago.

About 1,900 references (which refer to both volumes), together with author and subject indices, are provided. The book is well written and translated. It contains a wealth of material, much of it in tabular form, and should provide a most useful reference work for the research worker. The very fact that the book is so detailed makes it relatively unsuitable as a teaching monograph for students. My main complaint is at the price: volumes of similar size are currently published at a price half or less of the present book. Otherwise, it can be recommended to workers in the field.

R. A. SHAW

Phosphorus Chemistry

Phosphorus - Nitrogen Compounds: Cyclic, Linear and High Polymeric Systems. By H. R. Allcock. Pp. xiv+498. (Academic: New York and London, May 1972.) $24.50.

THIS book has been written by a research worker who has made notable contributions to the subject, particularly in the field of high polymers. It is exceedingly well written; the style is clear and concise, and the account of the subject is balanced and critical; it is remarkably free from mistakes.

The volume deals with monomeric, cyclic oligomeric, and polymeric phosphazenes, as well as with phosphazanes. The author develops the thesis (shared by several crystallographers active in the field) that the conformations these molecules adopt are dominated by steric factors rather than by π-bonding, that is, that the bonding adjusts itself to the stereochemistry rather than the reverse.

One point which the author touches upon briefly and which undoubtedly will attain greater significance in the future is the differentiation between those properties of the molecules measured in the ground state, for example, by X-ray crystallographic, nuclear quadrupole and nuclear magnetic resonance studies, and those where the distribution of electrons, and possibly also the shape of the molecule, has been changed either by electronic excitation or complex formation, for example, in basicity studies.

The appearance of the volume is extremely opportune as phosphazenes seem to have broken through the inertial barrier and are beginning to fulfil their long foreseen industrial uses. They are now being manufactured on a considerable scale and have achieved *inter alia* uses in flameproofing.

The book can be highly recommended to the teacher as well as the research worker—academic and industrial. It can be recommended for student reading, although it is somewhat long for an undergraduate course. In view of the rapidly rocketing cost of books, the price is not excessive.

R. A. SHAW