

Advances in Space Research

(Proceedings of the First Inter-American Symposium on Space Research, Buenos Aires, November 1960.) Pp. viii + 438. (London and New York: Pergamon Press, 1964.) 120s. net.

THE title of this book is somewhat misleading. Since it records the proceedings of a conference held in 1960, 'Advances' should be read as 'Past Advances'; and its subject is not only space research but also allied subjects like aerodynamics, rocket motors and other aspects of space technology. Despite their advanced age, however, many of the contributions are still of considerable interest. There are three general papers, all of which retain their value. R. W. Porter describes international co-operation in space and suggests possible aims for countries in Central and South America. H. L. Dryden outlines the future National Aeronautics and Space Administration programme: its planning was so good that his survey needs scarcely any amendment to-day. The third review is by H. E. Newell, on rocket sounding of the upper atmosphere.

It is only possible to mention a few of the specialized papers. There are several on aerodynamics: D. W. Holder describes the hypersonic research equipment at the National Physical Laboratory; F. G. Gravalos contributes a general review of supersonic aerodynamics, including free-molecule flow. Rockets receive a good deal of attention and there is a mathematical study of the effect of launcher length on rocket dynamics by E. Lorenzelli and J. F. Diharee. The subjects of other papers include space research in Japan (by T. Hatanaka), the National Aeronautics and Space Administration satellite tracking network (by J. T. Mengel), the use of high-altitude balloons for space research (by H. C. Ingrao and D. H. Menzel) and studies of solar ultra-violet radiation (by T. A. Chubb and W. A. Rense).

Though many of the papers are interesting, they would have been far more so three years ago, and the delay in publication is regrettable. The book, printed in Hungary, has quite an attractive type and layout. The number of misprints is above average, however, and so is the price.

D. G. KING-HELE

Refractory Transition Metal Compounds

High Temperature Ceramics. By G. V. Samsonov. Translated by Scripta-Technica, Inc. Translation edited by G. E. Gurr and D. J. Parker. Pp. viii + 220. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1964.) 72s.

THIS is a well-produced book dealing with a very complex subject in a very specialist manner. It contains nineteen papers by various authors, the papers varying in length according to the amount of information available on the subject under discussion.

Nearly half the papers are concerned with the interpretation of X-ray spectral data in terms of electron redistribution and orbital variations due to bonding in such materials as transition metal carbides, borides, nitrides and silicides. A number of these papers attempt to correlate the bond structure with the physical properties of the compounds and some interesting structure parameters are proposed. The possibility of predicting gross physical properties from electron-orbital parameters is shown to have some success.

In his introduction the editor points out that most reliable results are obtained by parallel investigations involving X-ray analysis and study of physical properties respectively.

There is abundant evidence of much painstaking experimental work in many of these papers, but actual experimental details are almost completely absent. One or two contributions rely on previously published work for their understanding.

On the whole, these papers provide a wealth of evidence to show that transition compounds are amenable to systematization and gradation on the basis of their electron structure. There is perhaps a lack of physical data concerning these compounds, but this is understandable.

The remaining papers cover electrical and thermionic emission properties of a large number of transition compounds. Again, the theme of many contributions is the search for relationships between structure and properties; for example, a relation was found between a structure parameter and metal-semiconductor transformation in a series of compounds. Conclusions drawn from this work are strangely reminiscent of Hume-Rothery.

Fitting rather awkwardly into the general theme of this book are papers on the preparation and properties of iron: silicon compounds and migration in solid solutions in an applied potential gradient. They are obviously included because of their unique magnetic and electrical properties rather than possession of high melting points.

There is a great deal to recommend in this small volume. Not least are the clarity and precision of the text, reflecting a very high standard of translation, adequate references (292 in all) and a useful index.

L. W. DERRY

Thermophilic Fungi

An Account of their Biology, Activities and Classification. By D. G. Cooney and R. Emerson. Pp. xii + 188. (San Francisco and London: W. H. Freeman and Company, 1964.) 36s.

FEW fungi or other organisms thrive at temperatures above 40° C, fewer still are able to grow only at high temperatures. The present book is concerned with these few, thirteen species of fungi incapable of growth at temperatures below 20° C and with upper temperature limits between 50° C (*Humicola stellata*) and 60° C (*H. lanuginosa*). Five additional species not studied by the authors bring the total number of known thermophilic fungi to eighteen, a heterogeneous group scattered widely through the systematic system, including two Phycomyces, five Ascomycetes, and eleven Hyphomycetes. At temperatures below 40° C these fungi tend to be overgrown by the common mesophilic moulds so that, though their spores may be widely though sparsely dispersed in Nature, their active mycelia are found normally in materials that have been through some natural process of microbial self-heating or have been held temporarily at temperatures around 35°–55° C by some other agency. They play an important part in raising the temperature of damp-stored plant materials from 35° to 40° C, a level induced by activity of mesophilic moulds like *Rhizopus nigricans* and *Penicillium glaucum*, to 60° C or over, until autocatalytic chemical processes start to operate, causing further heating and ultimate ignition. Thermophilic fungi occur also commonly in animal excrement and in birds' nests, while two species of *Mucor* and *Humicola lanuginosa* have been implicated in animal mycoses. The role of these organisms in Nature, as well as their possible use in industrial processes involving curing, fermentation or composting of plant products, remains largely unexplored and offers a fertile and exciting field for research in the near future.

R. W. G. DENNIS

Manual of Vascular Plants of Northeastern United States and Adjacent Canada

By Dr. Henry A. Gleason and Dr. Arthur Cronquist. Pp. li + 810. (Princeton, N.J.: D. Van Nostrand Company, Inc.; London: D. Van Nostrand Company, Ltd., 1963.) 92s.

DR. H. A. GLEASON'S 'hope and intent' that the three volumes of *The New Britton and Brown Illustrated Flora* should be condensed into a field manual to serve as a companion volume has here been realized