

The book is dedicated to Max Demorest, who lost his life while going to the aid of others in Greenland during the War, and his important contributions to glaciology are incorporated in the author's essential thesis on ice movement. Ten of the twenty-three chapters are given to an objective study, well documented, of glacier ice, its motion and regime, form and distribution, powers of erosion and deposition, periglacial deposits, and glacial stratigraphy. For many, these careful and up-to-date essays will be the *raison d'être* of the book. But sober and engrossing chapters follow on the glacial stratigraphy of North America, Europe and other lands, on changes of level of sea and land, on Pleistocene chronology and climates, on the causes of climatic fluctuation, and the fossil record. Specialists, each in his own field, will be able to supply references and data which will post-date some of those given in the book; some of the subjects are notoriously controversial, but, in the reviewer's opinion, Prof. Flint has dealt faithfully with the past and kept a keen eye to the future of many and varied researches.

The text is well illustrated, with a large number of photographs, some of them excellent, new and intriguing text-figures, tables of correlation and of estimated volumetric data on glaciers, both past and present. Folding plates at the end of the book show the present distribution of land ice, pack ice and storm tracks in southern and northern hemispheres; and stimulating impressions of the same features in the latter hemisphere during the last (Wisconsin) Glacial Age; distribution of loess (in particular) in Europe; glaciated areas in the western United States (with form-lines based on the general altitudes of the floors of the lower cirques); and a sketch-map of the glaciations of Europe. Author and publisher are to be congratulated on the general appearance and presentation of text and illustrative material.

"Glacial Geology and the Pleistocene Epoch" must surely become a standard work of reference; but it is more than that because it is a balanced, objective, creative, and stimulating book, written for an educated public rather than for a few specialists.

K. S. SANDFORD

## 91\* APPLICATIONS OF GROUP THEORY TO SOME PHYSICAL PROBLEMS

Theory of Groups and its Application to Physical Problems

By S. Bhagavantam and T. Venkatarayudu. Pp. xi+234. (Waltair: Andhra University, 1948.) 20 rupees.

IT is an obvious truism to say that the day is long past when each 'branch' of science was placed in a separate watertight compartment on its own, divorced from all the other 'branches'. On the contrary, it has become increasingly clear in recent years that these 'branches' are unified in one collective science, and that an advance in one 'branch' will often lead, at a later date, to an advance in some apparently totally different field of investigation.

This is particularly true when the former field is pure mathematics. Thus, the early work on infinite matrices, and the famous book of Courant and Hilbert, "Methoden der Mathematischen Physik", 2 vols. (Berlin: Springer, 1924 and 1937), provided

just what was wanted for the development of the Heisenberg-Dirac theory of quantum-mechanics; then linear operators in Hilbert space paved the way for a mathematically sound discussion of Schrödinger's wave equation, and led to proofs, by von Neumann and others, of the spectral resolution theorem for unbounded self-adjoint (hypermaximal) operators. Again, in 1913, by use of the Baire-Osgood theorem that the continuum is not a set of the first category, Plancherel and Rosenthal gave independent proofs of the impossibility of the Maxwell-Boltzmann theory of gases.

Now, in the book under review, the authors provide a lucidly written and well-designed exposition of the application of another abstract branch of pure mathematics, namely, group theory, to some physical problems. The book is exactly what the authors claim it to be, namely, a self-contained and connected account of the above application, intended for those who have no ready access to orthodox treatises already written on the subject. As such, it does not contain novel results, but shows the application of a mathematical tool to existing knowledge. A commendable feature of the book, which is of a mathematical nature, is that physical arguments are not glossed over, and all the results are discussed in detail.

After some introductory chapters on groups and lattices in one and two dimensions, applications of group theory are given to vibrations of a dynamical system, vibrational Raman effect and infra-red absorption, some simple molecules, lattices in three dimensions, vibrations of a crystal lattice, Raman scattering in crystals, rotation groups, problems of atomic spectra, electron spin, some aspects of band spectra, etc. There are also useful appendixes on various matters arising from the text.

In a foreword, Sir C. V. Raman writes of the book: "... It represents a serious effort to present a branch of mathematics which is of great and growing importance to physicists generally in a manner which will appeal to and interest them. I believe that the book will be widely read and appreciated." The present reviewer entirely endorses this opinion, and hopes that the book will be read, not only by physicists and applied mathematicians, but also by pure mathematicians who are not too 'pure'.

R. G. COOKE

## 716 WOODY PLANTS FOR AUSTRALIAN GARDENS

Shrubs and Trees for Australian Gardens

By Ernest E. Lord. Pp. xxiii+453+125 plates. (Melbourne and Sydney: Lothian Publishing Co., Pty., Ltd., 1948.) £5 5s 0d

THE flora of Australia is one that has always attracted the horticulturist as well as the botanist, both on account of the beauty of many of its species and also because of the high proportion of endemic types. The present work, which is written in non-technical language by a landscape architect and former curator of parks, treats of the trees and shrubs grown in Australia with respect to their horticultural value. To this end the descriptive matter is not such as to serve for the identification of species, but rather for assessing their garden significance and appropriateness for diverse purposes. Sections treat of the trees and shrubs recommended for the various