

ized analysis, its limitations and its method of approach. Chapters 2 and 3, entitled, respectively, "The Fundamental Machine" and "Two-Axis Theory", comprise the setting up of the machine equations in terms of the basic two-phase system and the development of the transformations for two-axis representation. In these two chapters, in the course of developing and manipulating the equations, the notation of matrices and certain matrix operations are introduced.

The next two chapters deal with transient and sub-transient conditions and with the setting up of the torque equations and, in the latter connexion, the rules of matrix multiplication are more fully exemplified. It is at this point that the analysis of machines of different types is taken up, direct current machines, induction motors and general commutator machines forming the subjects of individual chapters. The treatment is completed by a chapter dealing with small oscillations.

The book concludes with a short chapter entitled "Tensors" in which the author describes the relationship of electrical machine theory to differential geometry, the absolute differential calculus and to tensor calculus.

No prior knowledge of matrix theory is assumed. The requisite rules of operation are developed as required and their utility and validity demonstrated by appropriate examples. The most important fundamental concept of the "connection matrix" is introduced in the simple example of the d.c. series machine and is then more fully developed in relation to a.c. machines. The author states at the outset that, "The true concepts behind the two-axis theory are mathematical and for that reason the mathematical treatment in this book is less complicated and more satisfying than the usual physical approach". This claim can, in large measure, be sustained. The theory is developed in a clear, logical and systematic fashion and constitutes an excellent introduction to the subject. None the less, physical conditions viewed along with mathematical development can illuminate the subject and, by adding realism, carry conviction. The basic concepts which underlie two-axis theory could with advantage have been illustrated from the physical point of view.

Dr. Gibbs has arranged his presentation of the subject so as to lead into the important topics with a minimum of digression, and he has succeeded in developing with remarkable economy and clarity the principles of the subject to a point at which the reader can enter the more general literature of the field. To a reader with a background knowledge of the conventional theory of electrical machines the treatment is admirably suited. In particular the book will serve well the needs of teachers of undergraduate courses dealing with electrical machines, and of students in the final year of such courses. J. GREIG

A RUSSIAN VIEW OF EARTH HISTORY

Basic Problems in Geotectonics

By V. V. Belousov. Edited by John C. Maxwell. Translated by Paul T. Broncer. (International Series in the Earth Sciences.) Pp. xvi+809. (New York: McGraw-Hill Book Company, Inc.; London: McGraw-Hill Publishing Company, Ltd., 1962.) 108s. 6d.

BASIC Problems in Geotectonics is a monumental synthesis of Earth structure in which Dr. Belousov presents what he believes to be the main outcome of geotectonic research in the U.S.S.R. since the Revolution. The subject has long been a controversial one, and some of the facts and theories presented in this book are likely to be disputed by many workers in this field.

After a preliminary summary of the history of development of geotectonics there follow an outline of the

internal structure of the Earth and a discussion of its origin. The classification of structural forms observed in rocks exposed at the surface is both novel and stimulating. The following section on present and past vertical oscillatory movements is an important one, as these observations form the basis of his main thesis. The maps and sections which illustrate the variations in facies and thicknesses of Palaeozoic and Mesozoic formations in Central and Western Russia should prove to be of particular interest to workers outside the U.S.S.R., as they give a clear summary of detailed work not always easily accessible in this form. The next section discusses the theories of formation of folds and faults, and the last two parts present Dr. Belousov's views on the processes which have led to the arrangement of the larger structural units.

Dr. Belousov is very critical of the idea that orogenic belts are developed in regions of large horizontal displacement, although he does find it difficult to see how vertical movements alone can lead to the development of mountain chains where the rocks have been tightly folded and apparently strongly compressed. His belief in the prime importance of vertical movements leads him to assume that our knowledge of linear fold zones is totally inadequate and probably fundamentally incorrect. He suggests that the folding in the Appalachian Mountain chain has been incorrectly interpreted, and that the greater part of the nappe structure of the European Alpine chain is geometric speculation and, to use one of his favourite and frequent criticisms, "formalistically unsound". The notion that all fold belts are developed on the plan of the Alpine model could certainly be criticized, but Dr. Belousov's denial of the accepted structural geometry of the Alps seems scientifically irresponsible. For example, no Alpine geologist would dispute that the Prealpine nappes have been displaced horizontally at least 60 km, not, as Belousov suggests, a mere 11 km. He explains the formation of linear fold belts by vertical movements on long and deep fundamental flaws in the crust. Vertical movements on these faults lead to the stretching of the sedimentary cover, and a later reversed movement of the fault-block causes the previously stretched beds to become shortened and folded as they settle back into their original position.

Dr. Belousov believes that the deep ocean basins represent regions of subsidence formed as the result of a process of basification or "basaltization" of a relatively homogeneous granitic crust in comparatively recent geological time.

This is a book which all interested in Earth structure should read, for in it the evidence supporting the theory of oscillatory vertical movements of the crust is fairly fully documented. It should stimulate the reader to re-examine many of the generally accepted facts and theories, although Dr. Belousov's partisan approach to Earth science might be found to be somewhat exasperating. J. G. RAMSAY

THE HALLEY BAY EXPEDITION OF THE ROYAL SOCIETY

The Royal Society International Geophysical Year Antarctic Expedition

Halley Bay, Coats Land, Falkland Islands Dependencies, 1955-59. General Editor: Sir David Brunt. Vol. 2: Radio Astronomy; Ionospheric Physics. Pp. xv+289+14 plates. Vol. 3: Seismology; Meteorology. Pp. xvii+382+5 plates. (London: The Royal Society, 1962.) 140s.; 23 dollars per volume.

RIGHT from the inception of its International Geophysical Year Antarctic Expedition it has been one of the aims of the Royal Society that the results should be available promptly, particularly in view of the pace of