

Geophysics and the IGY

Proceedings of the Symposium at the Opening of the International Geophysical Year. Conducted by the United States National Committee for the International Geophysical Year, National Academy of Sciences, Washington, D.C., June 28-29, 1957. Edited by Hugh Odishaw and Stanley Ruttenberg. Pp. iv+210. (Geophysical Monograph No. 2.) (Washington, D.C.: American Geophysical Union of the National Academy of Sciences—National Research Council, 1958.) 8 dollars.

IN the whole of the programme for the International Geophysical Year nothing has captured the popular imagination more than the attempts to explore the upper atmosphere. It is likely that the layman does not entirely appreciate the scientific significance of all the *Sputniks* and 'Black Knights' that leave the surface of the Earth; but he is certainly made more aware of this aspect of the International Geophysical Year, via the writings in the press, than of any other; and, in a way, so it is for the geophysicist.

Almost three-quarters of the space available in this monograph on the International Geophysical Year is devoted to the physics of the upper atmosphere. Eighteen papers cover most aspects of this science from 'whistler' (audio-frequency radio waves arising from lightning discharges) studies to auroræ observations; and, of these, five concern the use of rockets and satellites in this high-atmosphere work. The papers in this section which are of most interest to the general scientists are probably those dealing with the observations to be made on the geomagnetic field. A detailed knowledge of the Earth's magnetic field is of practical importance in many forms of science and their related applications, from ionospheric and auroral physics to navigation and mineral exploration.

There are twelve papers in the more solid side of geophysics: that is, the lower atmosphere and the Earth itself. These deal with meteorological and oceanographic studies, the polar work that has been and will be performed, and with information concerning the shape, crust, and mantle of the Earth via gravitational and seismological measurements.

This book is the outcome of a symposium held last year before the main programme began. As such, of course, much of the information contained in it is conjectural and, at this stage, out of date. However, it is worthy of consideration by anyone interested in the doings of the International Geophysical Year.

D. TAYLOR SMITH

Quantitative Organic Analysis

By James S. Fritz and George S. Hammond. Pp. xiv+303. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1957.) 52s. net.

THE contents of this book are more accurately described by a subtitle ("The Use of Fundamental Principles for Solving Problems in Organic Analysis") than by its main title. The latter would lead one to expect the book to start with the usual description of elemental analysis, but this comes nearly half-way through. Instead, the opening chapter is an interesting discussion of the difficulties arising in the determination of carbonyl groups by oximation, which is taken as an illustration of the problems encountered in devising schemes for determining functional groups in general.

Other chapters deal with acid-base titrations in non-aqueous solvents, indirect acid-base methods, oxidative and reductive methods, manometric methods, metal ion complexes, kinetics in analysis, spectrophotometric methods, separations, and physical and polarographic methods. Finally, there are useful hints on solving new problems and details for certain standard procedures, such as determination of hydroxyl groups by acetylation, saponification of esters, and determination of sulphur, of unsaturation by bromination, and of peroxides.

This is not a text-book in the ordinary sense; rather does it discuss the underlying principles of various methods and their advantages and limitations. Although it mentions many applications, experimental details are usually rather too brief for practical purposes. For example, the ordinary 'combustion' method is described, but the diagram of the tube gives no indication of the dimensions in spite of the mention of the 'micro-scale'; and the statement that "Glucose has been determined by oxidation with iodine to gluconic acid" gives no hint of the effect of such factors as alkalinity, concentration and time. Also, under distillation, theoretical plates are mentioned but not defined. The section on chromatography is not up to date, and too cursory.

In spite of these few minor blemishes (and of the spelling of Tollens without his 's'), the book is well worth reading, for it is clearly written and gives a fascinating review of the great diversity in analytical methods now available to the organic chemist; moreover, it is very well produced.

A. D. MITCHELL

Dynamic Programming

By Richard Bellman. Pp. xxv+342. (Princeton, N.J.: Princeton University Press; London: Oxford University Press, 1957.) 42s. net.

MANY will have had glimpses over recent years of the work of R. Bellman in the field of multi-stage decision processes. Gradually, a body of concepts and methods has emerged for treating the many real problems that arise in this field. The developments to date have been collected and presented in the book under review, which is a Rand Corporation Research Study. The author begins with a chapter entitled "A Multi-Stage Allocation Process". This explains the type of practical situation to which the theory of dynamic programming relates and introduces the reader to the methods of solution. The next chapter adds a stochastic element to the problem of decision on a multi-stage process. The mathematical technique is developed in the next two chapters, and then follow three chapters on inventory and bottleneck problems. A chapter on multi-stage games is followed by a final chapter on Markovian decision processes.

This book, while very well written, is definitely an advanced text for the mathematician who is interested in the development and application of mathematical methods in management science, including econometrics. It will not be understood by most managers, but this may well be the result of our present social organization rather than a reflexion upon the author. It is not, after all, possible to convey highly technical concepts in a language that everyone can understand. The present book is an excellent example of the way in which mathematics is finding new domains of application, and for the first time clears the way for logical analysis of some time-worn riddles faced by business men. L. S. GODDARD