

Introduction to Satellite Geodesy

By Prof. Ivan I. Mueller. Pp. xxi+415. (New York: Frederick Ungar Publishing Co., 1964.) 15 dollars.

THIS book was written primarily as a text for students in the Department of Geodetic Science at Ohio State University, where the author is an associate professor. It is, consequently, an extremely specialized work, and in some parts reads more like lecture-notes than a text-book; for example, it begins uncompromisingly with a 9-page list of symbols. The subjects treated fall into two main divisions: the first, of 130 pages, covers the theory of occultations and solar eclipses, and their geodetic uses, in great detail and with many worked examples; the second division, which occupies some 250 pages, is devoted to artificial satellites and their geodetic applications. The subjects covered here include close-satellite orbital theory, methods of observation, the uses of satellites as 'triangulation points' for geometrical geodesy, and dynamical investigations using satellite orbits. The book ends with a specification for geodetic satellites, and the National Aeronautics and Space Administration *Satellite Situation Report* for September 30, 1963.

The author shows a very wide knowledge of the specialized literature and uses it most judiciously. More than 700 papers are listed in his bibliographies and from these he has extracted and presented the methods he likes best. The result is an excellent introductory text-book in satellite geodesy, comprehensive, up to date and well balanced. Readers should not be deterred by the unhappy blurb on the jacket: the publishers were unwise to associate nationalistic sentiment with a subject which, above all others, is world-wide. Though the book will not appeal to the general reader, those working on the subject will welcome it gratefully as a reference book; and any university which contemplates adding some space-age investigations to its syllabus will find here a ready-made course.

D. G. KING-HELE

Inorganic Ultramicroanalysis

(International Series of Monographs on Analytical Chemistry, Vol. 15.) By I. P. Alimarin and M. N. Petrikova. Translated by M. G. Hell. (Oxford, London, New York and Paris: Pergamon Press, 1964.) 40s.

ULTRAMICROANALYSIS concerns itself with quantities of materials ranging from micrograms to picograms, normal concentrations of reactant solutions being maintained by the use of small volumes of liquid media.

The present monograph collates and systematizes the information on those techniques of inorganic ultramicroanalysis which have been described in the literature since the time of the earlier publications of Benedetti-Pileher and his colleagues. It does not embrace the radiochemical work of McMillan, Abelson and Seaborg which led to the isolation of minute quantities of the first transuranic elements, neptunium and plutonium. The only mention of radioactive techniques in the book refers to the use of silver-110 and RaE to demonstrate the decrease in the adsorption on the walls of micro-vessels which have been coated with methyltrichlorosilane.

General ultramicro apparatus of capillary type is described in great detail; the use of various microscopes and micromanipulators is illustrated; condenser rods and fibre reactions are demonstrated. Moist chambers, centrifuges, micro-heaters and coloriscopic capillary cuvettes receive comprehensive treatment.

Wilson's qualitative scheme for systematic qualitative analysis is presented in didactic fashion. Micro methods for electrolysis, extraction and ion-exchange separation are lucidly described. Quantitative ultramicroanalysis occupies half the total text of the book. Ultramicro balances of many kinds are described with much theoretical detail, and other techniques for weighing are mentioned briefly. Microtitrations, with either colorimetric or

potentiometric endpoints, are described and the amperometric method developed. The volume ends with a concise description of the uses of the Holter-Malmstrom microcolorimeter and of the Beckmann ultramicroanalytical spectrophotometer.

Prof. Alimarin and Dr. Petrikova are to be congratulated on having written an excellent and comprehensive introduction to a subject which is slowly asserting its importance in the fields of research and industrial chemistry. This publication has considerable didactic value and will also be welcomed by lecturers in universities and technical colleges.

D. T. LEWIS

Chromatography in Geology

By Arthur S. Ritchie. (Methods in Geochemistry and Geophysics Series.) Pp. viii+185. (Amsterdam, London and New York: Elsevier Publishing Company, 1964.) 50s.

THIS slight text of around 50,000 words sails under false colours. It concludes with the statement that "in theoretical geology, chromatographic processes have become recognized as being of the greatest importance"—but all that is said on this topic amounts to no more than three short pages of obscure observations on gels and colloids. A more appropriate title for the book would have been "Chromatography in Inorganic Mineral Analysis", for after introductory chapters on "The Chromatographic Process" and "Chromatographic Techniques" it is with the analysis of soils, minerals and waters that the main section "Applications of Chromatography to Geology" is wholly concerned. It is, however, remarkable that a work concerned with the use of chromatographic techniques in the mineral industry should fail to mention not only the pioneer researches of the late F. H. Burstall and his colleagues at the Chemical Research Laboratory, during the early days of the British atomic energy effort, but also the milliard-dollar uranium industry utilizing the anion exchange resins then introduced. From the point of view of the academic geochemist, the omission of any reference to the importance of chromatographic techniques in recent American studies on palaeo-biochemistry is equally striking. Perhaps it is understandable that no literature from the U.S.S.R. should be quoted, but to write on the role of gels in mineral genesis without even mentioning Chukrov's Russian-language monograph *Colloids in the Earth's Crust* seems strangely inadequate. The 30-page index which helps to swell the book is for the most part unnecessary.

C. F. DAVIDSON

Annual Rings in Big Sagebrush, *Artemisia tridentata*

By Charles Wesley Ferguson. (Papers of the Laboratory of Tree-Ring Research, No. 1.) Pp. viii + 95. (Tucson: University of Arizona Press, 1964.) n.p.

IT is well known that after felling a woody plant with its annual growth rings, it is possible to determine its length of life by counting the growth increments on a transversely cut surface. Experts in dendrochronology can go a stage further, however, for by examining the growth ring pattern in a specimen that has long been dead, they can assess the probable date when it was formerly alive. Furthermore, with proper precautions, the width of successive annual rings can be used to draw conclusions concerning change in climate and ecological conditions as well as about the dates of archaeological sites. With these aims in view, the author of this booklet has made an intensive investigation of the annual rings in big sagebrush (*Artemisia tridentata* Nutt.) of the family Compositae, collected from selected areas in the western United States. *A. tridentata* is of special interest because of its capacity to 'invade' areas that are capable of growing, or which have grown, a grass cover. The structure of the plant is of interest to anatomists because of its ability to produce successive rings of interxylary cork in the wood.

C. R. METCALFE