BOOK REVIEWS

Horowitz, A. S. and Potter, P. E.: INTRODUCTORY PETROGRAPHY OF FOSSILS. 302pp. Berlin. Heidelberg. New York: Springer-Verlag, 1971. US$27.00.

Introductory Petrography of Fossils is perhaps one of the "glossiest" geology texts to appear in recent years, with about two-thirds of its volume taken up by photographic plates and plate descriptions. These same plates, however, admirably fulfill the authors' aim in writing the book, namely to assist students and researchers in the recognition of whole and fragmented fossils in thin-sections of sedimentary, and particularly carbonate, rocks.

Following a brief introductory chapter, the authors summarise the modern nomenclature and classifications used in petrographic studies of carbonate rocks and outline several models that have been used in attempting to interpret the environment of formation of carbonate sequences. The chapter concludes with an annotated selected bibliography of the literature of carbonate and fossil petrography from the classical works of Sorby in the mid-nineteenth century through to the 70s. Brief and valuable comment is offered on the content of each of the referenced articles.

Chapter 3 details the skeletal macro- and micro-structure and mineralogical composition of 18 major fossil groups. Line diagrams and tables summarise the important shell fabrics from several groups. The petrographically distinctive characteristics for all groups are clearly stated and the "subtle" differences between closely similar groups emphasised. Processes and products of diagenetic alteration of fossil constituents are briefly considered and illustrated by several plates.

The remainder and bulk of the book is occupied by 280 exceptionally high quality black and white photomicrographs of biofragments from 200 thin-sections of carbonate and other sedimentary rocks. The plates are large, commonly full-page (27 x 19cm), range in magnification from x20 to x100, preserve the finest detail at high magnifications and are adequately explained and referenced.

The book is aimed mainly at sedimentary petrologists who, without being specialists in paleontology, are commonly forced to identify fossil fragments in thin-section in the course of their studies. Unfortunately, the price of the book is likely to restrict its appeal as an undergraduate text in paleontology, stratigraphy and sedimentology; however, the text should always lie handy on the laboratory shelves in these courses.

C. S. Nelson.

Maunder, W. J.: THE VALUE OF THE WEATHER. 388 pp. London: Methuen & Co. Ltd. 1970. 40s (U.K.) paperback edition.

This book attempts to bring together, for the first time, the most important associations between man's economic and social activities and the variations in the atmospheric environment. It is concerned with the atmosphere as a resource and with the value of weather information, weather forecasting and weather modification to man. The author reviews many recent studies in the field of economic climatology and economic meteorology and brings out the need for more practical research into evaluating atmospheric resources.

After a brief introduction the second chapter shows the importance of weather variations. These include violent storms and precipitation extremes and

air pollution and atmospheric modification. The losses caused by extreme weather conditions are considered at the regional level and at the national level. At the national level they may be offset by benefits to other areas. The dangers resulting from air pollution are more serious in that the pollutants are often carried aloft and deposited many miles from the source. It is also emphasised that it is of fundamental significance that wastes accumulate in the atmosphere and permanently modify it.

The third and fourth chapters, which furnish over two-fifths of the text, deal with weather-sensitive activities. Here there is a wide-ranging review of the literature concerned with the economic effects of weather variations on specific activities in the primary, secondary and tertiary sectors of the economy. Such diverse activities as wheat and meat production, tree growth, fishing, brewing, construction, air transportation, fuel consumption, retail trade and the tourist industry are considered. This is followed by an examination of the relationships between selected sociological and physiological aspects of man's behaviour and the state of the atmospheric environment. Dr Maunder suggests that the controversial theory of climatic determination has some merit. He mentions the effects of weather on comfort and the growing interest in climatic classifications based on man.

In the next three chapters the economic analysis of weather, the benefits and costs of weather knowledge and a variety of political, planning and legal aspects of atmospheric resources are discussed. Attention is focused on the problems of obtaining the data in order to evaluate the economic effects of the weather and on the techniques that can be used in analysing them. It is shown that the demand for the available weather information is not great and that many decision-makers are unaware of the services and benefits that meteorology can offer at low cost. Today the overall benefit/cost ratio of a National Meteorological Service is approximately 20:1. Soon this ratio should be even higher as the international projects of the World Weather Watch and the Global Atmospheric Research Programme are expected to lead to considerable improvements in all types of weather forecasting. These improvements, as the author points out, have important implications for planning decisions. There are also many neglected legal and political problems associated with the differential and long-term effects of weather modification activities. Such problems are complex and of great economic and social importance to man. The book concludes with a plea for more information on the value of the weather.

The presentation is systematic and lucid. Each chapter is well documented with an up-to-date bibliography and is provided with an additional list of references. There is a detailed table of contents and four useful indexes. The tables explain and extend the text; the heavy line-work of some of the figures detracts from their value.

Dr Maunder's book will be welcomed by everyone who is concerned with atmospheric resources. At a time when monetary losses caused by adverse weather conditions are mounting and the possibility of preventing disastrous weather modification is being internationally discussed, it provides a valuable appraisal of the present position. The book should be of considerable interest to all students of meteorology, geography, economics and sociology as well as to planners, business men and thinking citizens.

Ruth S. J. Farmer.

Debano, L. F.; Letey, J. (editors): PROCEEDINGS OF THE SYMPOSIUM ON WATER-REPELLENT SOILS. Riverside: University of California, 1969. 354 pages; tables, figures.

The Symposium on Water Repellent Soils, held May 6-10, 1968, at the University of California, Riverside, brought together a number of scientists to exchange ideas and to clearly define research areas. Thirty papers were presented during seven sessions; each paper serving as a focal point for extended discussion. The sessions included papers concerned with: the distribution of water-repellent soils; the nature and measurement of the soil-water repellent condition; water movement (infiltration, hydraulic conductivity, and evaporation) in water-repellent soils; the modification of water repellency, especially by the use of wetting agents (surfacants) to increase soil wettability; the role of micro-organisms, vegetation, and fire in the genesis and intensification of water-repellent conditions; and with the effects of water repellency and wetting agents on plant growth. Many of the papers present basic data, information, and theory concerning the physical and chemical properties of water-repellent soils. Much of this data was obtained under controlled laboratory conditions. Several very informative and thought-provoking papers discuss such field conditions as horizon development, plant competition for water, sediment yields, and the inter-relationships between water-repellency and soil morphology, plant distributions, and erosional activity.

The Proceedings of the Symposium on Water-Repellent Soils is clearly the best single work devoted to this little known area of soil science. Individual papers are generally of high calibre. A short and concise summary of the discussion by the Symposium participants follows each paper. While the Proceedings successfully presents much of the current knowledge about water-repellent soils, its true contribution is measured by the number of unanswered questions raised concerning the inter-relationships between soil-water repellency and environmental processes, especially those involving the water-soil-plant system.

G. Thomas Foggin, III

Town and Country Planning Division, Ministry of Works. HAWKE'S BAY REGION. National Resources Survey, Part VI. 233pp. Government Printer, Wellington. 1971. $8.

Town and Country Planning Division, Ministry of Works. WANGANUI REGION. National Resources Survey, Part VII. 211pp. Government Printer, Wellington. 1971. $7.50.

These two reports continue the series of well illustrated and printed publications on the natural and economic resources of regions of New Zealand. The early chapters on the European History, Climate, Geology, Soils, Water Conservation and Land Uses give outlines of these subjects sufficient for general information. Although excellent as separate descriptions the differing levels of detail between climate, geology and soil can be frustrating to a reader looking for close relationships. Subsequent chapters on Regional Economy, Population and Employment, Industry, Tourism, Transport and Local Government bring together figures and conclusions from a range of sources to serve as a regional yearbook. The final chapter on Prospect gives a sober conservative assessment of future development. Whilst the predictions are probably justified, these are not inspiring to local enterprise. Perhaps they may challenge it.

Earth scientists will note a welcome trend in the classification of land. Previously crop and pastoral use have had "first pick" of lands, and forestry given only a choice of the remainder. This practice is continued in Hawke's Bay but the need and right for the expansion of forestry is recognised for this dominantly pastoral region. In the Wanganui region a classification of all soils for forestry is given indicating equal rights for this use, and it is unfortunate that the severity of the soil limitations do not encourage expansion of an industry. The basis of assessment should be reviewed when more is known of the forestry requirements on soil.

Accompanying each report are six coloured maps showing Physical Features, Geology, Soils, Potential Pastoral Use of Soils, Land Use 1967 and Land Tenure 1968, and in Hawke's Bay one showing Expected Changes in Land Use. These maps add considerable interest to the publication chiefly through extensions of local experience. This use of the maps may be assisted by placing the colour blocks on the reference panels so that they come before and not after the explanations. These reports are important means of assessing the resources of New Zealand and an early completion of the series is needed to obtain full value from these surveys.

H. S. Gibbs

Braitsch, O.: SALT DEPOSITS — THEIR ORIGIN AND COMPOSITION, 297pp. Berlin: Springer-Verlag, 1971. US$19.80.

This is Volume 4 of a Monograph Series of Theoretical and Experimental Studies entitled Minerals, Rocks and Inorganic Materials and is the first English translation of Professor Braitsch's text on salt deposits originally published in German in 1962. The book deals mainly with the geochemistry and mineralogy of evaporites and purposely avoids a detailed and exhaustive treatment of the petrography, stratigraphy and paleoenvironment of salt deposits.

The text contains 7 major chapters with several subsections. The introductory chapter emphasises the susceptibility of evaporite deposits to secondary alteration and accordingly the need for careful analysis when comparing geochemical theory with field and laboratory observations. Tables detail the names, properties and composition of the evaporite minerals and all the non-salt minerals known from salt deposits. The Permian Zechstein Salt Deposit of Germany is frequently referenced in the text and a brief outline of the lithostratigraphy of the deposit is included in the introductory chapter.

In Chapter 2 the solubility data are presented for several multicomponent systems, involving principally the end-members $CaSO_4$, Na_2SO_4, NaCl, KCl, $MgCl_2$ and H_2O, and their stability relations and crystallisation sequence discussed in terms of changing temperature, pressure and the common ion effect.

On the basis of the solubility data given in Chapter 2, Chapter 3 outlines limiting physico-chemical models for the formation and alteration of salt deposits under varying conditions of pressure and temperature and in the presence of normal and altered ($MgSO_4$-impoverished) seawater. The sequence and kind of salt minerals formed directly from the evaporation of normal seawater is shown to depend on whether precipitation occurs under stable or, the more usual, metastable equilibrium conditions. However, the preservation of metastable salt phases in the geologic record is unlikely since recrystallisation to stable assemblages takes place during early diagenesis. The highly reactive nature of the

salt minerals at relatively low temperatures and their inherent instability in the presence of migrating formation solutions, means that thermal and solution metamorphism play an important and commonly major role in the alteration of primary salt mineral assemblages. The effects of dynamic metamorphism on mineral alteration in salt diapirs are, at present, imperfectly known. The importance of certain minor elements, and in particular bromine and strontium, in controlling the above physico-chemical systems is outlined.

In Chapter 5 the author relates several field examples back to the proposed physico-chemical models (primary salt rocks, and thermal, solution and dynamic metamorphism salt rocks) and emphasises again the major problem of distinguishing primary precipitates from altered salts in fossil deposits: "(p. 153) . . . it is the goal therefore of special geological, petrographic and geochemical research to determine the processes of formation and to deduce each phase of the reaction for each (salt) deposit separately".

Chapter 5 outlines the behaviour and importance of trace elements (especially boron and iron), salt clays (mainly chlorite, talc, corrensite and illite), and various authigenic carbonates, fluorides, phosphates and magnesium silicates in the formation of salt deposits.

The final two chapters present a general discussion and several conclusions on the origin and composition of salt deposits, among which the following points may be briefly stated:

(1) Two major types of primary marine salt deposits are found in nature, $MgSO_4$ — enriched from normal seawater and $MgSO_4$ — deficient from altered seawater.

(2) A distinction is required between primary salt precipitates and salts of diagenetic and metamorphic origin. Salts are especially susceptible and reactive to temperature changes (thermal metamorphism) and infiltrating solutions (solution metamorphism) at relatively shallow depths.

(3) Thick salt deposits demand an influx of seawater.

(4) Salt formation is relatively insensitive to Eh and pH, although associated insoluble residues suggest a weakly reducing environment of formation with pH7-9. The non-salt minerals may play an important role in reacting with, and profoundly modifying, the enclosed saline solutions.

(5) The significance of annual rhythms, climate, tectonics and periodic variations in brine composition in producing the fine rhythmic bedding in carbonate anhydrite sequences is assessed.

(6) Bromine is perhaps the most sensitive minor component for interpreting the genesis, temperature of formation and diagenetic history of salt deposits.

The book is perhaps the most authoritative work on the geochemistry and mineralogy of evaporites. It is both a comprehensible and readable account, contains innumerable triangular and other graphic plots and tables on the solubility relations and other properties of the salts, but is otherwise sparingly illustrated, and presents an exhaustive bibliography on salts up until 1962. The book is likely to find appeal at the research level only and is clearly directed more at the geochemist than the geologist.

C. S. Nelson.

BOOK NOTICES

Flint, R. F.: GLACIAL AND QUATERNARY GEOLOGY, 892pp. New York, Wiley, 1971, A$16.75.

This is the third revision in 24 years of the widely read work by Flint. The book has been so completely rewritten that the only similarity with the earlier volumes is the continuing high quality of writing and presentation. This edition is 300 pages longer than its predecessors, and this has made possible a more detailed treatment of stratigraphy, Late-Cenozoic climates and deep-sea floors. No other modern book can approach it in width and depth of coverage, and it will be widely adopted in spite of its price.

Turekian, K. K. (editor): THE LATE CENOZOIC GLACIAL AGES, 606pp. New Haven and London: Yale U.P., 1971, US$20.00.

This volume contains 21 papers delivered as a testimonial to Richard Foster Flint to honour his retirement from Yale. The volume is a valuable review of the enormous increase in knowledge of past climates, from continental and marine evidence, in the last decade.

Dreyer, W.: THE SCIENCE OF ROCK MECHANICS, PART I: THE STRENGTH PROPERTIES OF ROCKS. 500pp. Clausthal, Germany: Trans Tech. Publications, 1972, US$25.00. ISBN, 0-87849-002-7.

This book is part I of a series of five books on engineering geology. It contains chapters on: mineral mechanics; rock mechanics; strength tests; rock properties; caves and caverns.

Sparks, B. W.: ROCKS AND RELIEF, 404pp. London: Longman, 1971. NZ$11.45.

The contents of this book include: a study of rock characteristics and denudation; igneous rocks and relief; metamorphic rocks and relief; sedimentary rocks and relief; dating and correlating rocks. A little more than a third of the book is taken up with a study of the relationships between lithology and landforms in Britain arranged by geological time series.

Steers, J. A.: APPLIED COASTAL GEOMORPHOLOGY

Steers, J. A.: INTRODUCTION TO COASTLINE DEVELOPMENT

Eyre, S. R.: WORLD VEGETATION TYPES London: Macmillan, 1971.

These three books, available in hardback or paperback covers are volumes in a series of 'Geographical Readings'. The aim of the series is to make available to a wider public papers which are not readily accessible. The choice of papers may well surprise some readers but there is sufficient of value in each volume to make the purchase worthwhile. The two volumes on coasts include the notable study by Jelgersma of 'Sea-level Changes during the last 10,000 years'; a long paper by Stoddart, 'Coastal reefs and islands and catastrophic storms'; and Steers' own 'The East Coast Floods'. The book edited by Eyre attempts to keep close to the intention expressed in its title and contains papers or parts of books which deal with features of a variety of biomes with each major climatic zone represented.

McKenzie, G. D.: Utgard, R. O.: MAN AND HIS PHYSICAL ENVIRONMENT, 338pp. Minneapolis: Burgess, 1972, US$4.95, paperback.

This collection of readings in environmental geology has been culled from scientific journals and reports, news magazines and news releases. The geologic aspects of health and disease, waste disposal, mineral resources and conservation; land reclamation; land use planning and geologic hazards are all represented. The presentation and coverage is inevitably uneven but the bibliographies attached to the more scientific articles should provide a start to the search for more detail.

Walker, D.; West, R. G.: STUDIES IN THE VEGETATIONAL HISTORY OF THE BRITISH ISLES, 266pp. Cambridge: Cambridge U.P., 1970, U.K.£8.

This volume of essays is in honour of Professor Harry Godwin, who retired from the Chair of Botany at Cambridge in 1968. The emphasis is, appropriately, on the Quaternary history of the British flora and its post-glacial modifications by early man.

Glennie, K. W.: DESERT SEDIMENTARY ENVIRONMENTS, 222pp. Elsevier: Amsterdam, 1970, US$20.

The stated aim of this book is to enable the reader to recognise ancient desert sediments and to differentiate between eolian and water-laid deposits. The bulk of the

book is concerned with the genesis and description of sediments deposited in a variety of modern desert environments — wadis, valleys, lakes and dunes. After each discussion modern and ancient desert environments and their deposits are compared. The approach is that of a very experienced field geologist passing on first hand experience without too much reference to the literature. The only fault with the book is its price.

Twidale, C. R.: STRUCTURAL LANDFORMS, 247pp. Canberra: A.N.U. Press, 1971. A$5.00.

This is volume 5 in the 7 volume series under the general editorship of J. N. Jennings. The contents include chapters on: joints, boulders and related features; inselbergs; landforms associated with faults; landforms associated with folded sequences. The distribution of topics clearly reflects Dr Twidale's own interests, and considerable experience of granite areas of South Australia. His omission of consideration of shields, platforms, ancient block mountains and young fold belts as entities will disappoint many readers.

Carson, M. A.: THE MECHANICS OF EROSION, 174pp. London: Pion, 1971, paperback.

Erosion as used by Carson is largely a process of transportation. The concept of stress; the mechanics of fluid erosion; stress — strain — strength relationships; mass movements; and glacial erosion are discussed in turn. The approach is through a study of the mechanics of the process and hence is entirely quantitative. The relationship between laboratory investigation and field study is not emphasised.

Kukal, A.: GEOLOGY OF RECENT SEDIMENTS, 490pp. London: Academic Press, 1971. U.K.£6.

This is a translation of a book originally published in Czech. The contents include studies of: sedimentary environments; weathering; rates of denudation and sedimentation; biologic component of sediments; fluvial, fan, eolian, glacial, lacustrine deltaic, beach, shallow water and deep sea sediments; and diagenesis.

Hunt, C. B.: GEOLOGY OF SOILS, 344pp. San Francisco: Freeman, 1972. US$12.50.

An attempt, like this one, to look at soil from the points of view of the geologist, soil scientist and engineer, is laudable. A critic might suggest that the author has never forgotten that he is primarily a geologist but this is a vast improvement on the usual attitude of geologists to soils. The agricultural significance of soil and the concept of soil as a living body get less emphasis than a pedologist would like, but the value of soils in stratigraphy is given sufficient emphasis to compensate for this. Unhappily the engineering aspects of soils are also given thin treatment.

Lamb, H. H.. CLIMATE: PRESENT, PAST AND FUTURE. Vol. 1: FUNDAMENTALS AND CLIMATE NOW, 613pp. London: Methuen, 1972, U.K.£11.

Volume 1, of this two volume study of climate, is divided into two sections. Section 1 discusses how climate is produced and the causes of climatic variation. The factors particularly examined include variations in the strength of the sun's radiation reaching the Earth; the effects of veils of volcanic dust and other suspended materials in the atmosphere; variations in heating and circulation of ocean waters; long-term variations in the accumulation of snow on the land. The emphasis of the book is that only through an understanding of the controlling physical laws can the workings of the atmosphere be deciphered. The second section of the book is a long appendix with global data on present-day climates and recent changes of climate.

Murdoch, W. W. (editor): ENVIRONMENT: RESOURCES POLLUTION AND SOCIETY, 440pp. Stamford: Sinauer Associates, 1971.

This book is a collection of original papers written by 20 authors, many of whom are widely acknowledged as experts in their respective fields. The chapters are in three groups — population and resources; environmental degradation; environment and society.

Watts, D.: PRINCIPLES OF BIOGEOGRAPHY, 401pp. London: McGraw-Hill, 1971. A$13.30.

As the title suggests this book is concerned with the principles of biogeography rather than descriptions of communities of plants and animals, The emphasis therefore is on energy relations within ecosystems. The contents include discussions of: energy controls; biogeochemical cycles; environmental limitations; population limitations; the time factor (i.e. dynamic aspects); man — all within ecosystems.

Doornkamp, J. D.; King, C. A. M.: NUMERICAL ANALYSIS IN GEOMORPHOLOGY, 372pp. London: Arnold, 1971, U.K.£4.

The increasing use of numerical methods of analysis of surface forms in geomorphology his given rise to this book. The topics studied are grouped under four headings: drainage basins; slopes; coastal forms; glacial forms.

Jennings, J. N.: KARST, 252pp. Canberra: A.N.U. Press, 1971. A$5.95.

This is volume 7 in the A.N.U. series of textbooks on systematic geomorphology. The examples used have, deliberately, a very strong emphasis on sources in Australia, New Zealand and New Guinea. The contents include consideration of: the nature of karst; karst rocks; karst processes; solution sculpture; drainage; surface landforms; caves; climate and rates of denudation; influence of structure; development of karst. There is a substantial bibliography.

Carroll, D.: ROCK WEATHERING, 203pp. New York: Plenum, 1970. US$15.00.

Weathering is that part of the geochemical process that results in the mineralogical adjustment of rocks to the chemical climate of the earth's surface with its atmospheric pressure and low temperatures. Geochemical weathering produces saprolites and pedochemical weathering produces soils. The value of this book is that it gives equal emphasis to both aspects of weathering.

Millot, G. (translated by W. R. Farrand and H. Paquet): GEOLOGY OF CLAYS, 429pp. Berlin: Springer-Verlag, 1970, US$16.80.

This review contains a summary of work on clays which is up-to-date to about 1963. The book deals with: clay minerals; argillaceous rocks; ions; the geochemical cycle; weathering; clays of continental sediments; silicifications; and the genesis of clay minerals. There are over 1000 references.

Pitty, A.: INTRODUCTION TO GEOMORPHOLOGY, 526pp. London: Methuen, 1971, U.K.£5.

The explosion in geomorphic research has necessitated a study of the way basic courses in the subject are presented. Dr Pitty has attempted to do this and has produced a book with a new look. He starts by a discussion of the nature of the subject and its basic postulates and then goes on to describe landforms and structure before coming to the main part of the book in which the physical, chemical and biological basis of processes and then the relationships between processes and landforms are explored. In addition landforms and time; and human activity and landforms are discussed. The main difference between this book and most others on the subject is in the treatment of processes: for the breakdown of rock, transportation and deposition are headings under which all processes are grouped; hence deposition of colluvial, alluvial, deltaic, estuarine, coastal, eolian and glacial deposits are considered together rather than with erosion and transport by one agent. The change of emphasis is refreshing and stimulating.

Runcorn, S. K. (editor): EARTH SCIENCES, 3 volumes, London: Applied Science Publishers, 1971, U.K.£20 for 3 volumes.

The papers contained in these three volumes are the Friday Evening Discourses in Physical Sciences held at the Royal Institution, London, between 1851 and 1939. The lectures were given by distinguished scientists on topics which cover a full range of the earth sciences and hence the published lectures provide an excellent record of the development of ideas. The words of Lyell, Geikie, Tyndall and Ramsay discussing advances in geology and glaciology, Captain Scott outlining his plans for an expedition to the South Pole and, more recently, Strutt, Bragg, Goldschmidt and others on 20th century advances in geochemistry and geophysics, are now readily available. The ease with which most of the papers can be read should shame some of today's purveyors of jargon.

Green, J; Short, N. M.: VOLCANIC LANDFORMS AND SURFACE FEATURES, 519pp. Berlin: Springer-Verlag, 1971, US$32.00.

This volume of coffee-table quality of presentation is a photographic atlas and glossary. The book contains a general introduction with a reference list of 83 items. It concludes with a comprehensive glossary of terms and reference list for them. The great bulk of the book consists of 198 multiple plates — most with two illustrations. The plates are classified in groups with the following headings: phenomenology of eruptions; calderas; volcanoes; internal structure of volcanoes; craters and maars; tuff and cinder cones; domes and laccoliths; spines, necks and diatremes;

dikes and sills; alignments of volcanic features; characteristics of flows; mudflows and lahars; pyroclastic deposits; erosion features; hydrothermal features; volcanism on the moon. Each photograph has a caption — most have lengths of 50 to 400 words. The quality of the plates and printing is uniformly high and the selection takes in examples from all the volcanic regions of the world. This book cannot fail to enlighten and delight the amateur and professional as well as the general public.

Kummel, B.; Teichert, C. (editors): STRATIGRAPHIC BOUNDARY PROBLEMS: PERMIAN AND TRIASSIC OF WEST PAKISTAN, 474pp. Lawrence: The University Press of Kansas. 1970. US$25.00.

This volume presents nine papers detailing the stratigraphical and paleontological relationships of beds across the Permian-Triassic boundary in the Salt Range and Trans-Indus ranges of West Pakistan. Professors Kummel and Teichert initiated the field programme in 1961 and the first paper, written by the editors, gives a very full account of the stratigraphy and paleontology of these latest Permian — earliest Triassic strata. The remaining eight papers, written by various authors, are shorter and of a more specialised paleontological nature, and include detailed studies of the brachiopods, ammonoids, marine ostracodes, conodonts, acritarchs, tasmanitids and spores and pollens at and near the Permian-Triassic boundary. The volume forces an entirely new interpretation of local paleogeography, offers a sound approach to the nature and interpretation of era boundaries, and discusses evolutionary changes of marine organisms from the Permian to the Triassic in the area. The material is well presented and illustrated and will appeal to stratigraphic paleontologists.

Doe, B. R.: LEAD ISOTOPES, 137pp. Berlin: Springer-Verlag, 1970. US$9.90.

This is Volume 3 of a Monograph Series of Theoretical and Experimental Studies entitled Minerals, Rocks and Inorganic Materials. The author presents a comprehensive and detailed up-to-date review of the variation of lead isotopes in minerals and rocks, and includes short explanations of the basic theory involved, and analytical techniques used, in measuring lead isotopes. Following a brief introductory chapter the author discusses the application and merit of U-Th-Pb isotopic dating on various minerals, including zircon, sphene, phosphates, pyrochlore, the epidotes, monazite, and uranium and other minerals and also on whole-rock crystalline rocks. In chapter 3 the use of common lead data in determining ages of meteorites and tektites, the moon (Apollo 11 samples) and earth, and of various rock-types are reviewed and, more important, the application of the isotopic data in helping solve various genetic problems (e.g. ore genesis, sources of igneous rocks, sediment source, metamorphism, etc.) are enumerated. A brief concluding chapter on radioactive lead isotopes, a large appendix giving the isotopic composition and ages of many samples and a comprehensive reference list makes this a valuable review article on lead isotopes for all earth scientists and chemists interested in isotope geology.