

## BOOK REVIEWS

*Fairbridge, R. W. (Editor): THE ENCYCLOPEDIA OF GEOMORPHOLOGY*, 1295 pp. New York: Reinhold, 1968. NZ\$50.

This volume is number three in the 'Encyclopedia of Earth Sciences Series'. Like its two predecessors on '*Oceanography*' and '*Atmospheric Sciences and Astrogeology*' it consists of contributions by a number of authors. In this case 152 authors have contributed 410 entries which vary from a few lines, to 20 pages for the article on 'Quaternary Period.' Most of the contributors come from North America, but many other countries are also represented.

Because presentation is in the form of essays rather than glossary entries considerable cross-references have been provided. At the end of each article there are bibliographic citations and references to other articles; the index at the end of the book is comprehensive; and there are references in the text to other articles in this volume or in other volumes of the series. The text is well printed with numerous illustrations. Many of the figures have been reproduced from original sources, but this has seldom resulted in poor reproduction.

As is inevitable in a work of this kind the entries are uneven in quality and originality. Many on such topics as river capture and structural control of landforms could have been written by anyone with access to the better known textbooks of geomorphology. Other articles, however, contain material which is not readily available in English, for example Büdel's article on 'Geomorphology-Principles', and Sweeting's on 'Karst'. A few articles, such as that by Enzmann on 'Geomorphology-Expanded Theory' which deals with the orders in a hierarchy of organised matter on the surface of the earth, contain material which is seldom considered by geomorphologists.

The style of presentation — especially that of the essay — is extremely effective and much more useful than short glossary-type entries would have been. The Encyclopedia is thus a valuable addition to any geomorphologist's library although the price will unfortunately restrict its possession to libraries and only a few individuals. It is probably most useful to students, although in a few cases it might be the starting point for an original piece of work. The major criticism of the book as a text on geomorphology concerns what has been placed in other volumes in the series. There is for example scant mention of tephrochronology which is to be dealt with in a later volume, and no general article summarising the methods used for dating landsurfaces. Even more important, there is little mention of methods of research — especially of the ways in which sediments are studied —, and no mention of the types of instruments used for research into geomorphic processes. There are few errors in the text, and the transposition of the captions to the figures on pages 1124 and 1125 is a most uncharacteristic slip. In brief this is a valuable book which is authoritative and well produced.

M. J. Selby.

*Reeves, C. C. Jr.: INTRODUCTION TO PALAEO LIMNOLOGY. DEVELOPMENTS IN SEDIMENTOLOGY* 11. 228 pp. Amsterdam, London, New York: Elsevier, 1968.

Volume 11 of the Elsevier Publishing Company's Developments in Sedimentology series is uniform in presentation with its predecessors, including the shiny paper. Palaeolimnology is the study of ancient lake basins, and one of the rather striking facts to emerge from the book is the number and extent of such ancient lakes, particularly in North America.

The book is divided into three sections, the first dealing with lake basins, the second with the lake itself, and the third with the Palaeolake Basin. Of necessity, much of the book deals with existing lakes, since the uniformitarian approach is as vital here as in any branch of geology. The coverage of the various aspects of limnology in the first section is fairly full, ranging through the various origins of lake basins, quantitative descriptions of lake basins (size, depth, volume, shoreline development etc.), and lake water and hydrological regimes.

As a volume in a sedimentological series I expected the treatment of lake sediments in the second section to be particularly full. Lake sediments, after all, constitute the chief record of ancient lakes, but in this aspect of the book I was somewhat disappointed. Chemical precipitates receive detailed attention but the chapter on clastic sediments is only nine pages long, and that includes the consideration of volcanic ash deposits. Sedimentary structures also receive a scantier treatment than I would have wished; there is, for instance, only one illustration showing a vertical section through old lake deposits. While there are several photographs of surface structures such as mud-cracks and gas rings in modern playa lakes, there are no illustrations of these same structures in vertical section, as they would be seen in old lake deposits. Again, one of the more interesting phenomena in sedimentation in lakes is the turbidity current; rather more is known about turbidity currents in lakes than in the sea, and it would have been useful to have had a summary of that information; but the only reference to the turbidity currents is contained in three lines, and there is no mention at all of the sediments deposited by them, not even a direct reference to the major work on the subject.

Another feature of more than passing interest in old lake sediments are the glacial varves. To find the discussion on these we have to turn to the chapter on Palaeoclimatic Methods, sub-section Geochemical Studies, where varves are discussed briefly in relation to Pleistocene chronology and  $^{14}\text{C}$  dating. There is only the briefest statement of the assumptions underlying the use of varves and the principles involved in their deposition. Here again, a good opportunity for an assessment of all aspects of varved sediments has been lost.

Part III of the book deals with the Palaeolake Basin. In this section there are chapters on Pleistocene Chronology, Distribution, Cause and Recognition of Palaeolakes, Palaeoclimatic Methods, Sampling Methods, and Future Palaeolimnological Applications. The section could equally well have been headed "Pleistocene studies in lake deposits." The coverage in the first three chapters of this section is wide, and represents a useful compilation of material. The accent on the Pleistocene is understandable, since almost any study of old lakes becomes a study of one or more aspects of Pleistocene stratigraphy. This third section could well be the most useful part of the book, since the material of the first section can be found in large part in texts on physical geology, and that of the middle section is disappointingly incomplete.

The material contained in this book is covered in part in courses of physical geology at elementary undergraduate levels, and in part in courses of sedimentology and stratigraphy in advanced undergraduate studies. The book would represent a handy reference on physical limnology for biologists and geographers.

P. F. Ballance.

*Strahler, A. N.*: PHYSICAL GEOGRAPHY (Third Edition), 733 pp. New York : Wiley, 1969.

Strahler's textbook is so well known and generally reckoned to be of such excellence that little more than a statement of the improvement is required for most readers. The most obvious change is the use of two colours on many of the line drawings. This has been done so skilfully that it invariably assists in

understanding the diagram. In the text there is increased stress on energy balance in the atmosphere and a greater emphasis on soils and vegetation although there are still only 60 pages out of 700 dealing with soils and vegetation. The Fahrenheit scale is still used for most climate maps although the Centigrade equivalent is given in the text. The U.S. Department of Agriculture (1938) classification of soils is still used but a note is added on the new U.S. system as outlined in the *7th Approximation*. In the section on landforms the approach is still that of explanatory description with little account being given of either geomorphic processes or even of such major new concepts as ocean-floor spreading and its results.

The third edition of *Physical Geography* will be very popular and will maintain the place in geography courses earned by earlier editions. Some users will be disappointed by the failure to give much regard to ecology and its implications for the geographer.

M. J. Selby.

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## NOTICE

The 24th International Geological Congress will be held in Montreal, Canada, during August, 1972. The programme will include 13 sections of technical papers and at least three symposia. Over 50 field excursions, most scheduled both before and after the conference, will cover all of Canada including the Arctic Islands. The First Circular will be sent out before January 1970. Communications should be directed to the Secretary-General, 24th I.G.C., 601 Booth Street, Ottawa, Canada.

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## BOOK NOTICES

*Bennison, G. M.; Wright, A. E.: THE GEOLOGICAL HISTORY OF THE BRITISH ISLES*, 406 pp. London: Arnold, 1969. NZ\$13.75.

In the Preface the authors describe their book as an "attempt to sketch the outline of the main geological events in the British area through the last 3000 million years." The book is "but a simple textbook which it is hoped will meet the requirements of the undergraduate student of geology by providing a framework of stratigraphical knowledge which can be filled in by further reading."

The book opens with a summary of the principles of stratigraphy and an account of fossils and stratigraphy. In the remainder of the book the systems are dealt with in chronological order for stratigraphy is interpreted as successive palaeogeographies rather than successions of strata. The book is well presented with over 100 figures, and forms a readable and up-to-date account of its subject with references up to 1968.

*Tricart, J.: LE MODELE DES REGIONS PERIGLACIAIRES* 512 pp. Paris: S.E.D.E.S. 1967.

This is volume two in a proposed twelve volume study of geomorphology. The book begins with a definition of cold climates and an outline of the morphogenetic systems of cold climate areas. The next 100 pages are devoted to a geographical account of periglacial phenomena and their distribution during the Quaternary. Chapter two discusses patterned ground phenomena and chapter three the evolution of landforms in periglacial environments. The last 100 pages are concerned with areas of contemporary periglacial activity and its practical significance. The book is well printed on good quality paper. There are 127 figures and an extensive bibliography — mostly of works in French or German.

*Pennington, W.: THE HISTORY OF BRITISH VEGETATION*, 152 pp. London: English Universities Press, 1969. UK45s.

This small book is an attempt to give an outline of the detailed work in the comprehensive volumes of Godwin and Tansley, and to form an introduction to them. It deals with the vegetation record chronologically through the Quaternary after a brief introduction which sets the scene at the end of the Tertiary. Inevitably the Weichsel Glaciation and later periods are given more attention than the earlier glacial and interglacial times, and the influence of man is made very clear. The last three chapters give accounts of the most common plant communities and some examples of a number of plant distributions. The text is well presented with 32 figures and 30 half-tones.

*Corbett, J. R.: THE LIVING SOIL*, 326 pp. West Como, N.S.W.: Martindale Press. 1969.

This book is designed for use by geographers at senior school and undergraduate level in Australia. The first half of the book is an introduction to the constituents of soil and the soil-forming factors. The second half describes soils according to the dominant processes, and concentrates on soils occurring in Australia. Throughout the text terms are explained as they are introduced so that no previous knowledge of soil science is required. There are about 90 figures

and no plates. The new FAO-UNESCO-ISSS nomenclature for soil horizons is used and accounts are given of the major world soil classification systems, including the new U.S.A. system and the system for the World Soil Map. The book is not only very clearly written but very up-to-date.

*Berry, W. B. N.:* GROWTH OF A PREHISTORIC TIME SCALE, 158 pp. San Francisco : W. H. Freeman, 1968.

Precambrian time encompasses nearly 80 per cent of the time from the formation of the earth's crust to the present, so this book which is concerned only with the time scale based on organic evolution deals with only the last 20 per cent of that time. The first third of the book discusses the need for a time scale, the principles upon which such a scale are based, various attempts at creating divisions in a scale and the contribution of Charles Darwin. The second third describes the historical events which led to the recognition of the geological periods, and the last third discusses subdivisions of the scale and the recognition of boundaries within it. The book gives a brief, but very clear account of the historical development of the geological time scale based upon the fossil record.

*Ragan, D. M.:* STRUCTURAL GEOLOGY, 166 pp. New York : Wiley, 1968. A\$6.25.

This introduction to geometrical techniques in structural geology is essentially a manual for use with a one-semester course. It begins with applications of orthographic projections to the solution of structural problems and progresses to stereographic projections. The stereonet is discussed and techniques of contouring and interpreting diagrams are included. At the end of the book methods of presentation and analysis of geologic data, including maps, structure profiles and block diagrams are developed. Use is made in all chapters of Mackin's method of down structure view of geologic maps.

*Schultz, C. B. ; Frye, J. C. (Editors):* LOESS AND RELATED EOLIAN DEPOSITS OF THE WORLD, 369 pp. Lincoln : University of Nebraska Press. 1968. US\$7.95.

This is volume 12 of the Proceedings of the VIIth INQUA Congress held at Boulder, Colorado in 1965. One group of papers is mainly concerned with the loesses and associated glacial events of central North America and most of the other papers discuss the loesses of Europe. One paper briefly discusses loess in central Asia.

*Richmond, G. M.:* GLACIATION OF THE ALPS. 177 pp. Boulder : University of Colorado Press, 1968.

This is volume 14 of the Proceedings of the VIIth INQUA Congress, and No. 7 in the University of Colorado Studies Series in Earth Sciences. It is only in the last twenty years when increased international travel and new exposures in cuttings made for post-war reconstruction have made possible comparison of one area of the European Alps with another that it has been realised that the classical work of Penck and Brückner (1901 - 1909) cannot be universally applied. The 17 papers in this volume present the state of knowledge in various parts of the Alps and suggest new correlations and areas for further research.

*Longwell, C. R.; Flint, R. F.; Sanders, J.:* PHYSICAL GEOLOGY, 685 pp. New York : Wiley, 1969. A\$6.95 (paperback).

This large, handsome, well-written and excellently illustrated volume is a new book, not merely a modified version of Longwell and Flint's *Introduction to Physical Geology*. The strength of the book is that it has the theme of the geologic and rock cycles running through the text and it emphasises the concepts of the open system in nature and the steady-state condition. The arrangement of topics in the text is conventional but new hypotheses and theories resulting from recent work in fluvial geomorphology and marine geology are introduced, and with them is discussed the research procedures and questions which led to modern conclusions. Out-dated concepts are also discussed and the ideas which led to them are described so that the reader gains a clear impression of the processes by which science advances. This book is an excellent educational as well as scientific text, produced at a remarkably low price.

*Gilluly, J.; Waters, A. C.; Woodford, A. O.:* PRINCIPLES OF GEOLOGY (Third Edition), 687 pp. San Francisco : W. H. Freeman, 1968. US\$9.75.

This book is a corrected and revised edition of its predecessor which appeared in 1959. The changes are considerable not only in content but also in presentation. The order and level of detail are conventional for this type of book and it provides a comprehensive background for first year classes in geology. Compared with the similar volume by Longwell, Flint and Sanders (see above) it lacks a continuity of theme, and rigour of analysis, and this possibly makes it more suitable for use by non-specialist students.

*Phinney, R. A. (Editor):* THE HISTORY OF THE EARTH'S CRUST, 244 pp. Princeton : Princeton University Press, 1968. US\$13.50.

This volume is the proceedings of a symposium held in November 1966. In spite of its title the symposium dealt more with the history of the ocean basins and of the mid-ocean ridges, and not at all with the fold mountains which were once the heart of structural geological studies. This is in accordance with the great advances, made in recent years, in knowledge of the ocean basins. The significance of sea-floor spreading, the implications for continental drift hypotheses, and expansion of the Earth are all discussed. It is made particularly clear by Bullard in his concluding comments that palaeomagnetism and sea-floor spreading provide a working hypothesis against which many features of the continents can now be studied.

*Shepard, F. P.:* THE EARTH BENEATH THE SEA, 242pp. Baltimore : The John Hopkins Press, 1967. US\$6.95.

This is a revised edition of a book which first appeared in 1959. It is an attempt to present in a non-technical language the main findings of modern research about the ocean waters, beaches, continental shelves, continental slopes, the ocean floor, sea-floor deposits and coral reefs. The material is well presented and illustrated. One omission appears to be the absence of discussion of sea-floor spreading and its implications.

*Ernst, W. E.* : EARTH MATERIALS, 150 pp. Englewood Cliffs : Prentice-Hall, 1969.

This slim book is one of the 'Foundations of Earth Science Series.' Unlike most books on petrology and mineralogy this book is brief, yet it provides a lengthier and more quantitative approach to the study of rocks and minerals than is usual, and the topics of mineralogy are based on the fundamentals of atomic and crystal structure, rather than on the external morphology of crystals and minerals. The basic principles of thermodynamics and physical chemistry are introduced as they are required and much of the work on mineral assemblages and their aggregate stability is related to temperatures and pressures at which they can exist. The book is well illustrated and produced.

*Scientific American Resource Library* : Readings in the EARTH SCIENCES, Vols. I and II. San Francisco : W. H. Freeman, 1969. US\$10 each.

The papers reproduced in these volumes are *Scientific American* offprints numbers 801 - 874. The volumes are bound in cloth and boards and each has about 300 pages. The articles are reprints of the original journal articles, without the advertisements, and have the same illustrations, — many printed in two colours. The major topics covered are : origin, composition and evolution of the Earth; Earth materials, features, forces and processes; oceans, atmosphere, weather and climate; time and the evolution of life; the Antarctic.

*Chorley, R. J. (Editor)* : WATER, EARTH AND MAN, 588 pp. London : Methuen, 1969. UK£5.

This book sets out to present a synthesis of hydrology, geomorphology, and socio-economic geography. It contains 38 papers contributed by 25 geographers, hydrologists, engineers, geologists and economists from Britain, the United States, Canada and Australia. The introduction indicates that one intention of the book is to bring together the disciplines contributing to geography and show how they need not continue to draw apart as they have been doing in the last twenty years. The theme of 'water' is taken as the core of common interest. The main topics are : the world — the hydrological cycle, water inventory and control, erosion and sedimentation; drainage basins — geometry and human use; precipitation; evapotranspiration; surface runoff; groundwater; channel flow; snow and ice — periglacial and glacial geomorphology; short-term runoff patterns and human response to floods; river regimes and climatic geomorphology; long term trends of climate and water use; choice in water use. With minor exceptions the papers are of high quality and well presented but it is questionable how much 'synthesis' has been achieved. The inclusion of a chapter on climatic geomorphology, for example, does nothing to promote this. The main value of the book will probably be the juxtaposition of papers on related themes from which the reader may create his own synthesis.

*Arthur, D. R.* : SURVIVAL, MAN AND HIS ENVIRONMENT, 218 pp. London: English Universities Press, 1969. UK45s.

This book results from the author's belief that far too little attention is being given to man and the environment in which he lives, by educationalists. It is a plea that human ecology should be part of everyone's general education. The book has four parts : the origin of man as an animal and the evolution of the other primates, especially of those most closely related to man; the resources needed for man's survival, especially food and the results of dietary deficiencies;

the effect of man on his environment, especially industrial pollution; effluents and pesticides; human populations with the implications of population growth. The book is illustrated with 63 figures.

*Machatschek, Fritz.*: GEOMORPHOLOGY, 212 pp. Edinburgh : Oliver and Boyd, 1969.

This book is a translation by D. J. Davis of the eighth German edition of Machatschek's book which had been revised by Hans Graul and Carl Rathjens. Machatschek died in 1957 and since then corrections have been made and chapters added on 'landforms and climate' and on 'anthropogenic influences and landforms.' Machatschek emphasises the connection of surface landforms with tectonic movements of the crust, but at the same time accepts the general validity of the cycle concept of W. M. Davis. This translation will bring to the English speaking student for the first time the thinking of a major German geomorphologist who expresses the significance of the ideas of A. Penck and accepts the significance of climate on landforms and the importance of relict forms in the present day landscape. The book contains 87 figures, is well presented and has an extensive bibliography.

*Maxwell, W. G. H.*: ATLAS OF THE GREAT BARRIER REEF, 258 pp. Amsterdam : Elsevier, 1968.

In spite of its title this book is essentially a synthesis of the geology and hydrology of the Great Barrier Reef illustrated with numerous figures and maps. Much of the work summarised here is the result of research in the last 15 years. It particularly stresses the effect of ancient drainage systems on present shelf morphology and sedimentary facies, of ancient strandlines on the localization of reef growth and of regression on reef sedimentation and reef morphology. The attention given to the biology of the reefs is limited. Of particular interest is the great diversity of reefs in this area which has about the same area as France.

*Morisawa, M.*: STREAMS, THEIR DYNAMICS AND MORPHOLOGY, 175 pp. New York : McGraw-Hill, 1968.

This small paperback is a valuable and concise treatment of its subject suitable for undergraduates with only a limited background in mathematics. After an introduction to general hydrology there is a discussion of water flow and sediment transport. Fluvial erosion and deposition, slope and channel morphology, graded profiles and the channel pattern are the main topics related to streams. The final chapter discusses drainage basins.

*Walton, K.*: THE ARID ZONES, 175 pp. London: Hutchinson University Library, 1969. UK30s.

This book is an attempt to give an account of all aspects of the physical geography of the arid lands and to indicate the significance of aridity for human occupation of them. The first chapter discusses the nature and causes of aridity and is followed by chapters on the climate, landscapes, biogeography, and water resources of arid lands. The last three chapters discuss cultivation, pastoralism and the future. It is shown that diversification is not only possible but represents the way deserts will be used in the future. The use of solar energy, desalination of ground and sea-water, the creation of new architecture and living conditions, breeding of new plants and animals will all assist occupation, but it is equally important that a new attitude to the environment should accompany technological change so that living standards may rise.

Davies, G. L.: THE EARTH IN DECAY, 390 pp. London: Macdonald, 1969. UK£5.

The subtitle of this book is 'A History of British Geomorphology 1578 to 1878'. It has usually been assumed that British geomorphology began in 1785 with the presentation of James Hutton's renowned theory of the Earth to the Royal Society of Edinburgh. Dr Davies' achievement is to trace the true origins back a further 300 years to William Bourne's *Treasure for Traveilers* of 1578. He shows that the gradual passing of medieval attitudes of mind and the beginnings of scientific enquiry affected not only the physical sciences but also the earth sciences. Before Hutton there was much discussion on the effects of Noah's flood and the age of the earth, and on volcanism and seismic activity. Before the 1690's there were few writers who doubted the effectiveness of the forces of erosion and this was seen to be in accordance with the accepted religious beliefs of the time in a decaying earth. The unfamiliar history of geomorphology before Hutton occupies over one-third of the book. There are eight plates and copious references.

Tratman, E. K. (Editor): THE CAVES OF NORTH-WEST CLARE, IRELAND. 256 pp. Newton Abbot: David - Charles 1969. UK105s in 1969, 120s thereafter.

The book was written by members of the University of Bristol Spelæological Society and records the explorations of the Society which began in 1953. The area covers about 130 sq km and contains 35 miles of caves. The pattern of underground drainage has been established and all of the caves mapped. The history, geology and geomorphology of the area and the caves is described. The theories of cave origin are discussed, and the main conclusion is that the caves have been formed within the last 20,000 years and mostly in post-glacial time. The form of the caves indicates, in most parts, a formation in two stages: first the formation of bedding plane type passages and then downcutting, to form meandering canyon passages, into the floor of the bedding plane. The first stage must have been phreatic and there is evidence in the roof of the caves of this. There is no evidence of more phreatic activity than this and none of Bretzian slow circulation of water deep under the water-table. Downcutting is obviously the work of vadose streams as phreatic action would produce all-round solution.

The book has appendices describing methods of cave surveying, and tracing underground water, as well as a bibliography of 192 items.

New Zealand Soil Bureau: SOILS OF NEW ZEALAND. N.Z. Soil Bureau Bulletin 26(1), 26(2), 26(3), 1968.

This three-volume survey is intended to give a comprehensive account of the classification, characteristics, use and distribution of New Zealand soils.

Part 1 contains five chapters with accounts of: the physical environment of New Zealand; the classification of New Zealand soils; a regional description of the soils; soils and land use; soil classifications for particular types of land use — particularly for pastoral farming. The end-pocket of this volume contains four full-colour sheet maps showing the soils, and soil classes for potential pastoral use for the North and South of the country. These maps are at a scale of 1 : 1 million.

Part 2 contains chapter 6 with accounts of the mineral weathering, sand fractions, clay mineralogy and amorphous constituents of the soils.

Chapter 7 deals with soil chemistry. Other chapters in the part discuss element composition of soils and plants, soil physics and engineering and biology of the main soils.

Part 3 has a brief account of the methods of analysis of soils and then a detailed summary of the 53 reference soils representing the main soils on the legend of the soil maps. Each summary contains a sample profile description and tabulated data on soil physics, soil engineering, sand mineralogy, soil chemistry, clay mineralogy and spectrographic analysis. At the end of the volume are 52 full-colour prints of uniformly presented monoliths representing the reference soils.

*Vita-Finzi, Claudio: THE MEDITERRANEAN VALLEYS*, 140 pp. London: Cambridge University Press, 1968. UK80s.

The first part of this book contains the evidence for geological change in the valleys of many areas of the Mediterranean coastlands since the last interglacial. This is done briefly and clearly with the aid of many maps and diagrams. It emphasises the value of radiocarbon and archaeological material for dating land-forms. The second part of the book reviews the factors which could have contributed to the observed changes and shows clearly the problem of isolating the effects of human activity on the nature and rate of erosion and deposition. The geological changes described are clearly summed up in Figure 3 which shows seven block diagrams of a Tripolitanian wadi. In pre-Würm times the valley was wide and open with no significant deposits on the bedrock. By around c. 30,000 B.P. at the time of Würm low sea level the valley floor was infilled with deep alluvium with calcareous crusts within it. Between c. 9000 and 2000 B.P. this infill material was trenched and in Roman times dams were built within the trench to trap silt. In the late Classical period c. 1600 B.P. gullyng of the infill developed. During the Middle Ages, especially in the fourteenth century, the floor of the valley was buried by a younger fill to maximum depth of 10m. At the present day both the older and younger fills are being eroded.

The causes of these changes are complex. There is some evidence which permits the tentative conclusion that the disturbance in the sediment supply and transport relationships which led to the deposition of the older infill was occasioned by an increase in frost weathering in the uplands, and by the seasonal incidence of more intense rains throughout the area; both of which led to a rise in the rate of interfluvial erosion. The erosion of the older fill was curbed by water and soil conservation measures at various stages in Roman times. As these measures were abandoned downcutting was resumed, but towards the Middle Ages aggradation produced the younger fill which frequently overlies Classical buildings and dams. It is this younger infill which is now being eroded. There is no clear evidence that climatic conditions in Roman times were appreciably different from those of today, but there is clear evidence that medieval Europe experienced a minor Ice Age and this favours the suggestion that the younger fill may be related to climatic causes. Little more than this can be said until a better understanding of the relationship between modern hydrological regimes and stream geometry makes it possible to interpret past stream morphology in terms of discharges, regimes and ultimately climate.

The book is very well illustrated and printed. The writing is fluent and pleasingly free of unnecessary technical terms, but the price will deter many who would otherwise wish to have this book on their shelves.

*Cole, J. P.; King, Cuchlaine A. M.: QUANTITATIVE GEOGRAPHY.* New York: Wiley, 1969. US\$12.75; paperback US\$7.50.

*King, Leslie J.: STATISTICAL ANALYSIS IN GEOGRAPHY.* Englewood Cliffs, N.J.; Prentice-Hall, 1969. US\$6.95.

These two books are the products of a revolution in geographical research and methodology, which has occurred during the last fifteen years. Before the revolution geography was closely tied to literary descriptions of 'regions' and to essentially cartographic analysis. The use of descriptive statistics began the change and was followed by inferential procedures such as significance testing, correlation and regression. Rapidly this led to an entirely new approach to the subject and forced a new look at the value of theory and model building. Advanced techniques of analysis, especially multivariate analysis, involved the use of high-powered computers, and has bred a new kind of geographer who is now writing the textbooks for the next generation.

Cole and King have written a book which indicates clearly the links between traditional and modern methods in geography. There are about 100 pages devoted to mathematics and statistics and the remainder of the book is largely devoted to case studies. Essentially this is a do-it-yourself approach for the beginner.

L. J. King has produced a different kind of book with a greater emphasis on theory and with the assumption that the reader is already acquainted with the relevant mathematics. Together these books provide a valuable basis for the modern geographer which will take him from the beginning to the research frontiers in his discipline.

*Péwé, T. L. (Editor): THE PERIGLACIAL ENVIRONMENT,* 487 pp. Montreal: McGill-Queen's University Press, 1969. US\$25.

In this book are 17 of the 29 papers presented at the Alaskan Field Conference held in association with the VIIth INQUA Congress in 1965. In addition there are eight papers written by other participants in the Congress. The book is divided into two parts. The first group of papers deals with processes and features in the present periglacial environment of the Arctic, Antarctic, and high mountains. Patterned ground, permafrost, soils and lichenometry are discussed. The second group of papers discusses fossil pingos, loess, slope developments, and other fossil phenomena now found in temperate regions. The book is well illustrated.

*Thornbury, W. D.: PRINCIPLES OF GEOMORPHOLOGY* (2nd Ed.) 594 pp. New York: Wiley, 1969. \$8.85 (paperback).

The first edition of this book appeared in 1954. Since then there has been a virtual revolution in geomorphology with the emphasis shifting away from studies of the cycle of erosion and its associated features towards morphometry, processes and other quantitative studies. Virtually the only recognition of this change, shown in this book, is the comment in the Preface that the author does "not feel competent to do justice to it". Such an omission means that we are still without the one volume review of geomorphology which students are seeking, and one may question whether the title of this book is still appropriate. There is, however, still a place for the sort of book which Thornbury has written, especially in courses on structural geomorphology, and on the historical ideas of the subject. Seen in this light, Thornbury's revision is useful. The new edition is about the same length as the old with relatively few changed sections. In the paperback edition many of the photographs have poor reproduction but the text is printed clearly.

*Keen, M. J. : AN INTRODUCTION TO MARINE GEOLOGY, 218 pp. Oxford : Pergamon, 1968. A\$5.50.*

This brief book is intended for students near the beginning of courses on geology. The main topics dealt with are : geophysical techniques for exploration of the ocean floor; topography of the ocean floor; pelagic sediments; abyssal plain sediments; movements of the sea floor; igneous rocks of the ocean basins; structure of the ocean basins; polar wandering and continental drift. Although each of these topics is only discussed briefly the treatment is up-to-date and the references sufficiently numerous for a student to gain a very clear impression of the many rapid advances in geological studies of ocean basins in recent years. The text is well written and illustrated, and although many possible topics are not dealt with — especially near-shore processes and forms — it will prove a useful introduction.

*Ruhe, R. V. : QUATERNARY LANDSCAPES IN IOWA, 255 pp. Ames : Iowa State University Press. 1969.*

Iowa is a key state in studies of the Quaternary in North America and two glacial stages, the Nebraskan and Kansan, and two interglacial stages, the Aftonian and Yarmouth, have their type sites there. The land surfaces of the area can be studied and dated in some detail using the well-developed loess beds as markers and <sup>14</sup>C dating of the more recent beds for absolute dates. Additional correlations are provided by the fossil mollusks, and weathering zones within the loess. Similar correlations are possible for the more recent glacial tills. Using palaeosols as marker beds Ruhe has reconstructed the geomorphology of Iowa at various times and shown how much of the present landscape has undergone modification during the Quaternary.

Although most of this work has been published before it is extremely valuable to have this expository summary available.

## NOTES FOR CONTRIBUTORS TO THE EARTH SCIENCE JOURNAL

### *Aims of the Journal*

Articles and communications submitted for publication should be either reports of research or other original contributions of wide interest to those concerned with geology, geomorphology, pedology, climatology, oceanography and physical geography. Reviews and summaries of the present state of knowledge in the various branches of the earth sciences, and papers which explore the interrelations of these sciences and the borders of traditional disciplines will also be welcomed. The journal will accept long articles but authors should consult the editor before submitting them.

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Contributions should be typed on good heavy-grade quarto paper, double spaced, with wide margins all round. The top copy and the top carbon copy should be sent to the editor and a third copy retained by the author. All matter to be printed in italic type (e.g. generic and specific names) must be underlined. Style and layout should follow "Selby, M. J., 1967: Aspects of the geomorphology of the greywacke ranges bordering the lower and middle Waikato Basins. *Earth Sci. Jnl.* Vol. 1, No. 1."

### *Abstract*

A brief summary indicating the scope of the paper and its principal conclusions should be included at the beginning of all articles exceeding 1000 words in length. Contributions in languages other than English must have an English language abstract.

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These should be consistent throughout the paper.

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These should be avoided.

### *Tables*

These are expensive to reproduce and must be kept to a minimum. Each table should have a heading and be numbered in arabic numerals. Units of measurement should be placed in parentheses at the head of the column and not in the body of the table.

### *Figures*

These are to be numbered consecutively in arabic numerals regardless of whether they are half-tones (photographs) or line blocks (graphs, etc.). Each must be referred to in the text and only such figures as are essential to elucidate the text can be published. Figures must be submitted ready for reproduction with all lettering and shading finished in Indian ink, and lettering done by stencil or Letraset in a simple style. The originals should be prepared on high quality dense white paper or on stable tracing materials with a good surface and need not be more than twice the size of the printed figure which cannot exceed  $8\frac{1}{2}$  x 6 inches (21.5 x 16 cms.). Figure numbers should not be on the figure itself, only in the caption.

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Cotton, C. A., 1942: *Geomorphology: An Introduction to the Study of Landforms*. Christchurch, 505 pp.

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