

Book Reviews / Critique

Bernard E. Manistre, *AGID Guide to Mineral Resources Development*
edited by Michael Woakes and John Carman / 43

John P. Coakley, *CRC Handbook of Coastal Processes and Erosion*
by Paul D. Komar / 44

William A. S. Sarjeant, *Discoverers of the Lost World*
by George Gaylord Simpson / 44

Jan Veizer, *The Earth's Sedimentary Shell: Quantitative Patterns of its Structure, Compositions, and Evolution*
by A. B. Ronov / 45

Guy Perrault, *Gold** 82
edited by R. P. Foster / 45

T. E. Day, *Handbook of Geology in Civil Engineering*
by R. F. Legget and P. F. Harrow / 46

Rex Gibbons, *Regional Trends in the Geology of the Appalachian-Caledonian-Hercynian-Mauritanide Orogen*
edited by P. E. Schenk / 46

L. J. Evans, *Residual Deposits: Surface Related Weathering Processes and Materials*
edited by R. C. L. Wilson / 47

Book Reviews

AGID Guide to Mineral Resources Development

Edited by Michael Woakes and John Carman

AGID Report Series No. 10
504 p., 1983, \$25.45

\$15.00 to AGID members in developing countries,

\$18.50 to members elsewhere

Reviewed by Bernard E. Manistre
International Relations Office
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario K1A 0E8

The editors of this useful volume are careful to point out in their foreword that it does not contain highly technical dissertations, and that it is directed primarily toward policy makers, geologists, mining engineers, teachers and students in developing countries. This concept is very much in line with the basic philosophy of AGID itself, and has resulted in a collection of twenty-two chapters, each devoted to a different aspect of mineral resources development, and written by separate authors.

In spite of the declared emphasis, many geologists in the (relatively) developed countries will also find the broad scope of the work useful in providing overviews of many aspects of resource development with which they may not be familiar.

For policy makers, the book begins with an assessment of the Geological Survey requirements applicable to a small country. Although the emphasis is placed on the organization of a 'basic' Geological Survey, the author recognizes that a typical Ministry of Mines must also include a regulatory branch to deal with the legal aspects of mining. The balance between surveying, (revenue spending), and regulating (revenue generating) is one of the problems frequently facing policy makers in developing countries, where funds are often limited. Every combination is possible, from the very small country which has no existing mines

to regulate but wishes to explore for mineral wealth, to the country with a large existing mining industry, which prefers to carry out its own mineral exploration. In the latter case, a portion of the economic wealth, generated by the industry, may be taxed to support governmental geological surveying and research, which is vital to the country's long term interests but might not be justified in short term industrial economics or political expediency. That there are some Geological Surveys which are only indirectly concerned with practical mineral exploration is not always understood in developing countries where, in general, the government Geological Survey has to cover everything.

Given that the development of a healthy mining industry is an asset to any country, the conditions under which the industry obtains its development funds, its place in the national development program, and the training of its personnel are all of importance to the policy maker. These topics are dealt with in chapters 2 through 4, in a manner which clarifies the pitfalls which exist in poor mining codes or overtaxation, outlines what is involved in the evaluation of a mining project, and provides an analysis of a training institution.

Chapters 5 through 9 discuss mineral prospecting and the tools most often employed in mineral exploration programs. These include the use of satellite imagery, geochemistry and geophysics, both airborne and ground techniques. Happily, the authors have not merely condensed what can be found in textbooks, but have made conscious efforts to show the place and value which these disciplines can have in a country's mineral development program.

By the end of chapter 9, hypothetical policy makers have thus received excellent advice on the economics of mineral development and the techniques normally employed in mineral exploration. They have also discovered that mineral exploration is a high risk business and that, with the best geological information possible, the chances of finding a new mine are still small indeed. The next step in the exploration process, which involves the evaluation

of all existing data and the possible decision to institute an expensive drilling program, is therefore critical. In developing countries, geologists may be reluctant to expose their reputations to the risk of a wrong technical decision, and the policy maker may be hesitant to commit financial resources whose loss might result in political criticism. Hence, it would have been nice if chapter 10 could have discussed the integration of scientific data leading to the evaluation of a typical exploration target, written by, for example, the exploration manager of a large mining company.

Chapter 10, however, assumes that the mineral deposit has already been found and deals with sampling techniques applied to known ore bodies, mineral dumps, etc. This is of less interest to the policy maker but valuable in its own right to the geologist or mining engineer involved in the development of existing occurrences.

The storage and retrieval of large amounts of geological data also becomes increasingly important as mineral development proceeds. A description of some of the most recent systems is provided in chapter 11, based on the work of COGEODATA and the use of computerized files.

The importance of small scale mining can hardly be overemphasized in developing countries. Small or low grade deposits, which would be considered uneconomical in international terms, may still be mined in developing countries. The technology, economics and management of small mines are well discussed in chapters 12 through 14, including the description and costing of various processing techniques.

The rest of the book is of primary interest to geologists, except for chapter 16, which deals with pricing and marketing in the minerals industry and really belongs near chapter 2. The case history for working an old gold mine is particularly topical, as is the chapter on exploring for uranium, for countries looking for alternative energy sources. The remaining chapters deal with diamonds, placer exploration, fertilizers, laterites and structural materials, all of which are of concern to mineral resources development. Of course, the reader will

think of other aspects of resource development which might have been included, but considering the collective experience represented in this book, it is a real bargain. In many ways it is a unique and generally successful attempt to explain the geological sciences to the policy maker, and the economic constraints of the policy maker to the geologist.

CRC Handbook of Coastal Processes and Erosion

By Paul D. Komar
CRC Press, Inc.
 305 p., 1983, \$80.50 US

Reviewed by John P. Coakley
Hydraulics Division
National Water Research Institute
Canada Centre for Inland Waters
 P.O. Box 5050
 Burlington, Ontario L7R 4A6

There are few geological processes which can raise the level of anxiety of the average citizen as much as the process of coastal erosion. Most owners of shore property or seaside vacationers have a first hand acquaintance with how coastal processes can effect noticeable and sometimes disastrous changes in shoreline position, with the resulting impact on valuable shoreline real estate. So an up to date handbook aimed at providing practical information on this subject is indeed welcome. This book, for a variety of reasons, does not fill this need. One reason is that the book's emphasis on scientific research rather than on a "how to" approach limits its potential users to researchers and consultants in the earth sciences and coastal engineering and, possibly, to informed coastal zone planners. Furthermore, the book is basically a compilation of chapters on important aspects of coastal processes, each written by recognized experts in these fields. For that reason, the bulk of the material making up the book has been presented before in other forums, to a greater or lesser extent. Although it is beneficial to have them all together in one volume, there are the inevitable breaks in continuity of theme that result. Lastly, the handbook suffers from the omission of a separate chapter on sediment transport, an area where much important work is being done.

These are rather minor shortcomings, however. The book is well written and illustrated throughout. Both in its contents and in the reference lists that are included, it provides an up to date view of research in coastal processes and background

material for erosion-related engineering practice. It also provides useful syntheses of data on US coasts (e.g., shore erosion rates) that would have been hard to find elsewhere. Unlike earlier books on the subject published in the United States, it includes research results on lesser known US coasts, such as the Great Lakes, as well as work on Japanese and Australian coasts. Its wide subject range, detailed attention to background research and its adherence to metric rather than Imperial units, make it a useful complement to the more pragmatic *U.S. Army Corps of Engineers Shore Protection Manual*.

Because space does not permit a detailed review of each of the component chapters, only the highlights will be reviewed here. The introductory chapter by Paul Komar is an excellent twenty-page summary of the present situation in coastal process research. Chapter 3, by Wright and Short, though intricately written, provides useful insight into how beach form affects its response to wave impact. Chapter 5, by Nummedal, may well become the definitive work on barrier islands and their related processes. Chapter 8, by Hands, brings the perspective of long-term lake level rise to the interpretation of profile and platform changes in Great Lakes shore zones (Lake Michigan). However, examples from other lakes would have been instructive. Chapter 12, by Sunamura, outlines for North American readers his innovative research into cliff and platform erosion. Here, again, examples from coasts composed of glacial sediments (of considerable importance in the Great Lakes and Scandinavia) would have been appreciated.

To sum up, this book is definitely the most recent and up to date word on the subject of coastal processes and erosion. While it probably will not replace earlier, classic reference texts (*U.S. Corps of Engineers Shore Protection Manual*; King's *Beaches and Coasts* and Zenovich's *Processes of Coastal Development*), it serves as a very useful complement in presenting the state-of-the-art in coastal processes and erosion. The price in Canada (\$80.50 US), or almost \$0.30 per page, is steep, but considering the content and quality of the book, this money is well spent.

Discoverers of the Lost World

By George Gaylord Simpson
Yale University Press
 231 p., 1984, \$25.00

Reviewed by William A.S. Sarjeant
Department of Geological Sciences
University of Saskatchewan
 Saskatoon, Saskatchewan S7N 0W0

The fascinating, and often dramatic, story of the discovery of the dinosaurs in Europe and North America is known, in outline at least, to most naturalists and paleontologists having any interest in the history of their subject. Mrs. Mantell's finding of the *Iguanodon* tooth; the discovery of dinosaur bones during the Lewis and Clark expedition; the fiery quarrels between Cope and Marsh – all these episodes are a part of the folk tradition of geology.

In contrast, there is little awareness of the events that have attended the discovery of the extinct Tertiary mammals – even about what has happened in North America, let alone concerning the finding of the unique faunas that inhabited South America in the past. Yet that story is equally fascinating and dramatic.

My own interest in South American Tertiary mammals was awakened early, when in 1962 a close friend and fellow student at the University of Sheffield, David Spalding, decided to make them the subject of his B.Sc. dissertation and transmitted excitedly to me the facts he was unearthing. At that time, David contemplated writing a book on them, but the project came to nothing; however, I treasure still, and have used often for class material, his dissertation.

A popular account in English of the remarkable ungulates, marsupials and rodents of South America was not available until 1980, when George Gaylord Simpson published his *Splendid isolation. The curious history of south American mammals* (Yale University Press). Dr. Simpson was uniquely qualified among North American vertebrate paleontologists to write on this topic, not only because of the immense breadth of his knowledge of fossil mammals generally, but also because he has worked in South America. (His personal account of the Scarrit Patagonian expedition, *Attending marvels. A Patagonian journal*, has been recently made available in paperback by Time Inc., New York, 1982, after being too long out of print.) However, though *Splendid isolation* is an excellent and stimulating survey of those unique faunas, the lack of information concerning their discovery was, to me, deeply disappointing.

It was gratifying, therefore, to have that want so completely fulfilled by the book here reviewed. At last, an English-speaking readership can read the history of the finding of these strange creatures, from the first sighting of fossil bones in Peru in 1590 by the Jesuit priest José de Acosta, almost to the present time. Some of the names in this story are well known – Darwin, Humboldt, Cuvier. Others, though well known in South America, are less familiar outside that subcontinent: the brothers Ameghino in particular – quiet, perceptive Carlos and explosive, opinionated Florentino, with his strange mixture of original observation and wild theorizing. Yet others have been undeservedly forgotten: Juan Bautista Brú y Ramón de Madrid, the first person ever to attempt to mount the bones of a fossil animal into life position (*Megatherium*, some time around 1790); André Tournouer, determined collector of South American cave faunas; and the strange, reclusive Dane, Herluf Winge, who worked so carefully and long on the Lund collection in Copenhagen.

Dr. Simpson, perhaps because of his South American connections, has contrived to delve more deeply into the South American paleontological literature than most of us can manage. I noted with a little pain, but without surprise, twenty or so references and a number of individual geologists that should have been cited in my bibliography of *Geologists and the History of Geology*, but were not. (Well, that can be remedied in the *Supplement* soon to be published.) His careful explorations of the complexities of South American mammalian taxonomy (e.g., on p. 136-137) were both useful and, to me at least, very interesting.

There are a few minor errors. For example, "Friedrich Heinrich Alexander Freiherr [= Baron] von Humboldt, to give his full name" (p. 16-17) but that was not Humboldt's full name, which was Friedrich Wilhelm Heinrich Alexander.... On the complex question of Cuvier's baptismal and informally-given names (p. 10), it may be noted that the one he used, Georges, was applied to him by his parents (in, I feel, rather macabre fashion) after the death of an elder brother so named. There are a handful of typographical errors (e.g., "Osburn", p. 140; "unkown", p. 158), and a few matters I would like to have seen covered, or more fully covered, in the later pages of this book. A little more on the work of the late Llewellyn Ivor Price (a Brazilian, despite that splendidly Welsh name!) would have been welcomed, and I feel that Giuseppe Leonardi's extensive discoveries of latest Triassic or earliest Jurassic protomammal footprints deserved mention, as among the earliest indications of mammals in South America. I feel also that Dr. Simpson gave his own work unduly short shrift, but per-

haps he considered it to be treated sufficiently fully in his "unconventional autobiography" *Concession to the improbable* (Yale University Press, 1978).

However, these objections are trivial. This is a splendid and fascinating book that deserves to be read by anyone interested in the history of how the animals of the past were discovered. Dr. Simpson's death, in the fall of 1984, brought to an end a career of writings so insightful as to influence the ideas of a whole generation of biologists and paleontologists. This last, fine work places a fitting capstone upon his achievements and merits a wide readership.

The Earth's Sedimentary Shell: Quantitative Patterns of its Structure, Compositions, and Evolution

By A.B. Ronov
*American Geological Institute:
Reprint Series V
80 p., 1983, \$15.00 US; paper*

Reviewed by Jan Veizer
*Derry Laboratory, Department of Geology
University of Ottawa
Ottawa, Ontario K1N 6N5*

This soft cover booklet is an English translation of the twentieth Vernadskiy lecture, published originally in Russian in 1980. It represents a synopsis of thirty years of intensive work by Ronov and associates. The data base established by this group serves as a background for almost all quantitative considerations of terrestrial geology. The lecture, and the booklet, are subdivided into three chapters, dealing with (a) the structure and the composition of the present stratosphere, (b) the evolution of the sedimentary shell, and (c) the global geochemistry of carbon.

Section (a) contains tabulations of volumes and masses for the major global tectonic domains and their sediments. These variables are considered both in their spatial and temporal dimensions. The major conclusion of this section is that the outer spheres of the Earth reflect an irreversible, unidirectional evolution from predominantly "geosynclinal" into platformal modes, that is, a growth and stabilization of the continental crust.

Section (b) considers lithology and chemistry of sediments during the Phanerozoic and the Precambrian in their temporal dimensions. The manifestation of the above tectonic evolution in the sedimentary shell is a progressive decrease in the

importance of immature sediments and of mafic source areas during geologic history, particularly during the Archean-Proterozoic transition. Furthermore, the sediments also reflect an increase in the partial pressure of oxygen and a decrease in CO₂ in the atmosphere-hydrosphere system. The latter trends were a consequence of the development of life.

Gold' 82

Edited by R.P. Foster
*A.A. Balkema
753 p., 1984, \$45.00 US*

Reviewed by Guy Perrault
*École Polytechnique
C.P. 6079, Succursale A
Montréal, Québec H3A 3C7*

The interest in gold as reflected by the scientific literature on the subject has grown tremendously in the last decade, paralleling the price of gold with approximately a two-year lag. There have been many national and international scientific meetings on the subject, resulting in many comprehensive books on the metallogeny of gold and on descriptions of gold ore deposits. The Zimbabwe symposium, convened by the Geological Survey of Zimbabwe and held in mid-1982 at the University of Zimbabwe, is probably one of the most important of such recent meetings, and the proceedings are now offered in the book under review, *Gold' 82*.

Gold' 82 is a very fine collection of 39 papers by 50 authors on 6 topics:

1. Gold: general
2. Abundance and distribution of gold in crustal rocks
3. Transport of gold in hydrothermal fluids
4. Stratabound gold deposits
5. Non-stratabound gold deposits
6. Regional setting and controls of gold mineralization

Many of the better known scientists of the metallogeny of gold have contributed to this book; to name a few known particularly to the reviewer, R.W. Boyle, J.H. Crocket, R.P. Foster, N.S. Fyfe, A.M. Goodwin, R.W. Hutchinson, R.R. Keays, R. Kerrich, E. Roedder, R. Saager, and there are many others not singled out because of my own shortcomings.

The book begins with an excellent overview by K.A. Viewing of the technical sessions held in Zimbabwe, followed by a short note on the international role of gold by D.A. Etheredge.

The five other subjects listed above are very unevenly documented in the text. On the *abundance of gold*, it is clear that

our data base is meager. On the *transport of gold in hydrothermal fluids*, the thoughts proposed by Fyfe and Kerrich are interesting and the review of fluid inclusion evidence by Roedder is comprehensive. Examples of *stratabound gold deposits* are drawn principally from Africa, and it is regrettable that Witwatersrand gold deposits are represented only by one abstract. There are many Canadian examples in the section on non-stratabound gold deposits, along with Australian and African examples. The last section, on regional setting and controls of gold mineralization, draws principally from African gold deposits.

The third topic, geochemistry of carbon, intrinsically follows from the preceding discussion. This section points out the great antiquity of life, which is as old as the rock record. On a shorter timescale, it is claimed that rates of volcanism, carbonate deposition, and storage of organic carbon correlate. Tectonism is believed, therefore, to have been the principal mechanism controlling life and atmospheric CO₂, an observation pertinent from the point of view of the much discussed CO₂ greenhouse. As an aside, it is prophesized that the Earth machine will cease to operate in its life sustaining mode in about a billion years from now, a time scale of some consolation to the presently living *Homo sapiens*.

Although I personally believe that the approach in this booklet underestimates the role of cycling processes and some of the quantitative parameters are partially an artifact of methodology, the booklet is a must for anyone interested in fundamentals of the evolution of the Earth.

Undoubtedly, the Earth evolved, and the evolutionary and uniformitarian concepts are not mutually exclusive, but complementary.

All in all, this book should be of interest to gold economic geologists working with gold. I think it should also be recommended reading to graduate students working on gold deposits. Readers of this review might measure my appreciation by the fact that I have bought five copies and made the book compulsory reading for all my students of Abitibi gold deposits. While I would not hesitate to recommend its reading to non-specialist economic geologists, I would consider it of little interest to others.

Handbook of Geology in Civil Engineering

By R.F. Legget and P.F. Karrow
McGraw-Hill Book Company
 1,350 p., 1983, \$94.50

Reviewed by T.E. Day
Day & Associates Glacial Geologists
 961 South Bland St.
 Halifax, Nova Scotia B3H 2S6

Nobody has done more than Robert F. Legget to promote the use of geology in civil engineering. However, the reputation neither of Legget nor his co-author, P.F. Karrow, is enhanced by this book.

The text is seriously outdated and contains frequent, fundamental errors and misleading statements. The illustrations are mostly trivial and add little to the text.

The authors include many of the sort of mistakes an undergraduate might make. For instance, they have failed to grasp basic concepts of weathering (p. 5-27 and 5-31); they suggest that rates of weathering are "of little practical significance" (p. 5-5) and that geomorphology is a "branch of geology concerned with soils". They also contend that the terms *Quaternary* and *Pleistocene* are synonymous, and that 'nobody sells soils'. There are many, many more such examples.

Virtually all progress made in geology since the advent of plate tectonics is ignored in this book. Approximately 75 per cent of the references pre-date 1960! The authors, for instance, make the extraordinary statement that the only book in English dealing with the geology of water supply was published in 1911 (p. 28-38). Their glacial map of North America appears to be largely derived, unacknowledged, from a book published in 1926. The irrelevance of this book to modern engineering geology is also shown by the fact that there are only four and a half pages dealing with offshore structures, two of which are devoted to lighthouses.

Even the title of the book seems inappropriate, since it is more a collection of case studies than it is a handbook designed to help solve specific problems. All too often the illustrations consist of photographs of obsolete equipment, scenic views and monuments to historic events. Rarely do we see graphs illustrating relationships between variables; nowhere do we see any theoretical or even empirical equations which quantify or generalize relationships.

The verbose, rambling nature of the text appears to have its origins in the probable way in which the book was written. The book seems to have been produced as a 'scissors and paste' exercise upon two earlier

and better books by Legget, *Geology and Engineering*, first published in 1939 with a second edition in 1962, and *Cities and Geology*, published in 1973. It would have been much better to let these seminal books remain as a monument to the enormous contribution that Dr. Legget has made to engineering geology. The only good thing I can say about the present volume is that the high price will prevent the book from gaining wide circulation.

Regional Trends in the Geology of the Appalachian-Caledonian-Hercynian-Mauritanide Orogen

Edited by P.E. Schenk
NATO ASI Series
Series C: Mathematical and Physical Sciences, Volume 116
D. Reidel Publishing Company
 411 p., 1983, \$53.50 US; cloth

Reviewed by Rex Gibbons
Newfoundland Department of Mines and Energy
 St. John's, Newfoundland A1C 5T7

This book represents the proceedings of a NATO Advanced Study Institute of the same title held in Atlantic Canada and Fredericton, New Brunswick on August 2-17, 1982 (a meeting in Fredericton preceded by a ten-day field trip across Atlantic Canada).

This book is a mélange. It contains 39 presentations on a variety of different aspects and parts of the orogen. Some are full length dissertations; others are one- to three-page abstracts; some are generalized overviews.

Nine papers, pages 1-73, are on geophysics, with the largest emphasis placed on gravity, magnetics and paleomagnetism. The first paper, by Haworth, is an introductory overview which also lists the significant papers elsewhere that provide an introduction to the geophysical literature on the orogen. There are three significant papers on the Appalachians, including Roy *et al.* on the paleomagnetic record of the Appalachians, Miller on gravity and magnetic studies of crustal structure in Newfoundland, and Kane on gravity evidence of crustal structure in the US Appalachians. There are also short reviews on the crustal structures of the Scandinavian Peninsula and of the Mauritanides orogen as deduced from gravity data.

Five papers, pages 75 - 162, are on stratigraphy and sedimentology. A 37-page

stratigraphic "sketch" of the Caledonide-Appalachian-Hercynian orogen by Poole *et al.* is excellent. A 32-page review by Skehan and Rast of the relationships between Precambrian and Lower Paleozoic rocks of North Atlantic Avalonian terrains is also well done. Schenk's 10-page paper is a good introduction to the Meguma terrane of Nova Scotia. The other two papers of this group are short notes on Scandinavia (by Gee and Sturt) and Morocco (by Said).

The next group of four papers, pages 163-192, is on volcanism and plutonism. These include short notes by Stephens *et al.*, Francis *et al.*, and Cabanis on Scandinavia, Britain and Ireland, and France, respectively. The fourth, by Fyffe *et al.*, is a 13-page summary of four reviews by Rankin, Wones, Size and Fyffe on volcanism and plutonism throughout the Appalachians.

There are seven papers on metamorphism, pages 193 to 274, and eight on deformation, pages 275-353. However, this book is not inexpensive at \$53.50 US, and I believe it could have been produced at a much lower cost.

One of my criticisms is of the book's appearance, with so many different type styles. For this price, I expect typesetting and consistent style and editing.

Another criticism is the lack of consistency in format, particularly of the references. Some have no titles; some are numbered, others alphabetical; some are over-abbreviated. For future volumes such as this, I suggest that an appropriate "Guide to Authors" be used, with examples of type style, reference format, report layout, figure captions, system of measurement and abbreviations, etc. And I believe the price can be cut to at least half by producing it through one of the participating agencies, for example, a university or a government department.

Finally, I believe that any geoscientist will find this to be a useful review of the Appalachian-Caledonian-Hercynian-Mauritanide orogen. If you work in any part of the orogen, it is a "must" reference work, as much for its lists of relevant references as for the text. Have your library order it today.

Residual Deposits: Surface Related Weathering Processes and Materials

Edited by R.C.L. Wilson
Geological Society Special Publication No. 11
Blackwell Scientific Publishers
 258 p., 1983, \$50.00 U.S.

Reviewed by L.J. Evans
Department of Land Resource Science
University of Guelph
 Guelph, Ontario N1G 2W1

Residual deposits at the earth's surface probably have not received the same attention by geologists and pedologists as have transported materials, and much controversy is still generated as to the origin of calcretes, laterites, bauxites, etc. This book is a welcome addition to redress the balance. The volume contains 25 chapters arranged into four subsections – Weathering processes (3 chapters); Kaolinites, laterites and bauxites (8 chapters); Red beds (3 chapters); and Duricrusts: calcretes, silcretes and gypcretes (11 chapters). Most of the papers were presented at the Geological Society, London, England in March 1981, with three additional contributions.

The first chapter contains somewhat of a mixed bag of review papers, beginning with a discussion of the implications of lichen weathering on pedogenesis, continuing with a review of porewater reactions in the unsaturated zone and concluding with a review of experimental weathering of basic rocks. These three chapters, although equally applicable to discussions on transported materials, set the tone for the rest of the book, i.e., a series of short, well written, well illustrated and informative papers on various aspects of the study of residual deposits.

Contributions in chapter 2 outline the genesis and paleoenvironments of bauxites, laterites, lateritic bauxites and kaolinized and silicified deposits from Europe, America, Asia and Africa, by examining their petrology, mineralogy and geochemistry. Ages of the deposits range from Carboniferous to Tertiary. The relative roles of bedrock geology, landscape position and paleoclimate in controlling the distribution of these deposits are discussed.

Chapter 3 examines the genesis of red beds by studies on the reddening of contemporary coastal dune deposits and of a Carboniferous mudstone-dominated red bed succession. Each of the papers invokes pedological processes as being largely responsible for the reddening of the deposits and questions traditional thinking on the origin of red beds. It is suggested that the

processes of podzolization and laterization as factors in red bed formation have been largely underestimated in previous considerations, and that such pedological processes considerably speed up the reddening process.

The final chapter deals mainly with the relative importance of both pedogenic and non-pedogenic processes on the formation of silcretes and calcretes. Even when pedogenic processes are implicated, the duricrusts may have formed in a variety of contrasting environmental settings. It is suggested, for instance, that silcretes form not only in organic-rich, low-lying depressions, but also in well drained topographic highs. Caution is advised here, as in the previous chapters, in applying previously accepted models for the formation of residual deposits to specific field examples. Also included within this chapter are discussions on the accumulation of U and V in calcretes and gypcretes, C and O isotopic abundances in calcretes, a geochemical classification of calcretes, karst related fluorite-baryte deposits and Cenozoic pedogenesis and landform development in south-east England.

In conclusion, I found the book informative, relatively error-free and often provocative. Several authors rightly conclude that there are many areas in the study of residual deposits where fruitful cooperation between pedologists, sedimentologists and geochemists would solve many of the current problems involved in determining the origin of residual deposits. I have no hesitation in recommending this book to any geologists interested in the study of these deposits.