

BOOK REVIEWS

Mineral Deposits of Europe. Vol. 3. Central Europe. F.W. Dunning and A.M. Evans, editors. The Institute of Mining and Metallurgy and The Mineralogical Society, London, 1986, 355 pp., US\$150.

This volume is a valuable and timely addition to the literature of economic geology. So far, it has been difficult, if not impossible, to find what one has been seeking amongst the widely scattered references on Central European ore deposits. This task has now been greatly facilitated, a fact which will be appreciated by geologists, mining engineers, economists and administrators alike. *Mineral Deposits of Europe*, vol. 3, is a beautifully produced book, providing a wealth of information on the geological framework and on active and abandoned mines in an area covering almost one million square kilometers, with a population approaching two hundred million.

There are nine chapters, each with its own list of references:

1. Introduction, by K. Schmidt and B. Kölbl
2. Austria, by Herwig F. Holzer (pp. 15-40)
3. Switzerland, by Felice J. Jaffè (pp.41-54)
4. Poland, by R. Osika (pp.55-98)
5. Belgium, by L. Dejonghe (pp.99-112)
6. The Netherlands, by H.M. Harsveldt (pp.113-116)
7. Czechoslovakia, by Zdenek Pouba and Ian Ilavsky (pp.117-174)
8. The Federal Republic of Germany, by H.W. Walther (pp.175-302)
9. East Germany, by L. Baumann et al. (pp.303-330)

There are also two comprehensive indices: names, pp.331-336; subjects, pp.337-355.

The contribution on Austria gives a concise, well-illustrated overview of the general geology, and the major producing deposits, especially Bleiberg (Pb, Zn), Erzberg (Fe), Hallein (NaCl), Mittersill (W) and Schläining (Sb). There are useful statistics, covering both metallic ores and industrial minerals, and short comments on historical aspects and non-economic mineral occurrences.

The chapter on Switzerland gives an impressive overview of the great number of mineral occurrences in that country, ranging from gold to uranium, and from copper to fluorspar and nephrite. However, with the exception of rock salt in Triassic evaporites, none of them is actively exploited at present.

Poland is today Europe's largest copper producer, with an annual production in the order of 400,000 tons of copper metal per annum. It is also a very important producer of lead, zinc and many other

commodities, including rock salt, bauxite and nickel. It is, therefore, deplorable that the most important source of copper, the Kupferschiefer, has not received the attention it deserves. In fact, the name "Kupferschiefer" does not appear at all, and the worried reader finally discovers that it is hidden under the stratigraphic term, "Werra Cyclothem Z1". Many exciting new aspects, such as the discovery, in Kupferschiefer deposits of the Lubin mine, of significant precious-metal contents, are not mentioned, and the respective references are not quoted. This chapter also suffers from a widespread shortcoming in East European publications, *i.e.*, cryptic maps and sections. These require the reader to take a three-step approach: identify a signature on the map, rediscover it in a one of up to 14 numbered boxes, and then find the number with the associated rock-type in the legend.

The very short chapters on Belgium and The Netherlands underline the fact that metal mining (Fe, Pb-Zn, Cu), which flourished from 1850 to 1870, finally ceased in Belgium in 1978 with the closure of the last iron mine. In The Netherlands, only rock salt (~ 2 mt/year) is presently being exploited.

There is an impressive contribution on Czechoslovakia; a number of important ore deposits, including Jachimov (Joachimsthal), Pflibram, Kutna Hora (Kuttenberg) and others, are discussed in a concise and well-illustrated manner. There are two parts, one covering Bohemia and Moravia (Zdenek Pouba; pp. 117-146) and the other Slovakia ("The Carpathians", Jan Ilavsky, pp. 146-174). Production figures for all metals (except uranium) are included in the text. The reader wonders why separate lists of references have been produced of these two parts, and why only 19 references are quoted for the Slovak section. Although the scientific investigation of ore deposits in Czechoslovakia goes back to the early 19th century, it is surprising to find only three pre-World-War-II references. These observations do not, however, detract from the fact that this is an excellent contribution, and a compliment to the achievements of recent years.

The chapter on the Federal Republic of Germany has both width and depth, and represents the results of a team effort under the leadership of H.W. Walther. There are a number of concise descriptions of well-known deposits, *i.e.*, Rammelsberg, Black Forest, Meggen, Wiesloch, Harz Mountains, and Siegerland, to mention but a few. The authors have succeeded in providing a comprehensive overview, and in including all deposits and occurrences which have been or still are being worked. There are comprehensive statistics of past and present mineral produc-

tion. This is a superbly illustrated chapter which, in addition, presents results of recent exploration-campaigns.

The chapter on East Germany provides a good, and reasonably comprehensive survey of the geotectonic evolution and mineralization of that country. The detailed discussion of the famous Freiberg mining district, including the tin deposits of Altenberg and Ehrenfriedersdorf, is of particular interest. There is also a condensed discussion of the Kupferschiefer within the context of Zechstein paleogeography. It would have been good to see this continued on the Polish side of the border.

This volume is a must for every geological and mining library, and an attractive and necessary addition to the bookshelves of everyone concerned with mineral deposits in Europe, not only scientists and engineers, but decision-makers in administration and politics, as they often determine the course of a country's "Rohstoff-Politik". It also shows that there is still ample scope for exploration and further study, in spite of a long tradition of geological research. The editors should be congratulated on a remarkable achievement, that of combining, in one volume, and in good English, contributions not only from different countries and from authors of six different mother-tongues, but also from both sides of the Iron Curtain. No undertaking of this magnitude can produce results without shortcomings, and reference to the latter should be viewed in this light.

Eugen F. Stumpf
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Crystal Structures and Cation Sites of the Rock-Forming Minerals. By J.R. Smyth and D.L. Bish, Allen & Unwin, Winchester, Mass., 1988, 332 + XIXp. US \$50.00.

Selected crystal-structure and cation-site data are tabulated for the more common minerals of igneous, metamorphic and sedimentary rocks. Exceptions include a large number of not-so-common simple oxides including synthetic phases; however, sulfides and minerals at high temperature and pressure are excluded. The introduction graphically shows the strong correlation between the central angle variance (degrees squared) *versus* the quadratic elongation, and the electrostatic site potential *versus* cation charge. The structure-type diagrams are mostly polyhedra, but include some ball-stick and a few ball-stick stereographic pairs.

Confusion is possible because Figure 02 uses site potential (V), Table 1-10 use site energy (kcal/mole), and Table 11 uses EE (electrostatic energy in eV). Since crystal system and crystal class can be determined from space group, the publication of crystal

system and crystal class is unnecessary. There are many more recent crystal refinements in the literature than used in this book. Since only the atomic coordinates are given for the cations, there are insufficient data to make other calculations.

The reference list would be easier to use if the second and additional lines were indented rather than the first line. The book has significant (~40%) wasted space, e.g. Tables on pages 35, 37, 38 and 40 could easily have been assembled on one page; the total content of pages 292, 293 and 294 is "Chapter 10 Halides".

The most useful part of this book is Chapter 11, which gives individual tables for each coordination number and lists the cation sites by increasing mean distance between cation and anion within each table. Geochemists interested in a deeper understanding of physical properties and element distributions in natural systems are the primary audience for this book.

Peter Bayliss
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An Introduction to Ore Geology (second edition). By A.M. Evans, Blackwell Scientific Publications, Inc., Palo Alto, 1987, 358 pages, US \$48.00 hard-bound, \$23.95 paper.

This book is an expansion and up-dating of Evans's 1981 textbook, which I used as a text in my undergraduate ore deposits course for some years. The first edition provided very up-to-date material, profusely illustrated in a well-organized format. Although the first edition was rather brief in its text, it provided students with a good outline of a course on ore deposits, which could be amplified. The price of the first edition was quite reasonable for the paper bound edition on its release; however, with the decline of the Canadian dollar (perhaps among other factors), its price had more than doubled in five years, in our campus bookstore, and I ceased to use it in favor of the better value of the Guilbert & Park (1986) edition of *The Geology of Ore Deposits*.

Evans's new edition contains nearly all of the material of his first version, but with the addition of more than one hundred pages. New chapters are devoted to deposits of diamonds, greisen deposits and pegmatites; chapters on vein deposits, ore genesis and mineral economics have been significantly expanded to include such topics as unconformity-type uranium deposits and disseminated gold deposits. Throughout, the new edition cites references as recent as 1986, comprehensively updating the first edition. Basically, the book is an excellent undergraduate-level text, which I shall again consider using.

My reservations about the book are few and, with one exception, minor. A few of the drawings seem to be of such a trivial nature as to be a waste of space (such as Fig. 15.1 and 15.2, illustrating textures in porphyry copper ores). Also, a few misconceptions or even factual errors of the first edition are carried over to the second edition. Among these are the suggestion that the Archean Soudan Iron Formation is a Lake Superior-type banded iron-formation and that the Sullivan mine contains pyrrhotite as a pseudomorph after hornblende. (In fact, most the amphibole in the Sullivan is actinolite of metamorphic origin, which was formed subsequent to primary deposition of pyrrhotite.) My major reservation is the price, which may be rather high when converted to Canadian dollars, with additional mark-ups. The competition mentioned earlier may remain a better value for the money. However, given the strength of the Canadian dollar at the time of writing, this factor may not be as significant.

Stephen A. Kissin
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Mantle Metasomatism and Alkaline Magmatism. E.M. Morris and J.D. Pasteris, editors. Geological Society of America Special Paper 215, 1987. 383 pages. Softbound, US \$45.00.

This book is a collection of papers selected from among those presented at a symposium on alkaline rocks and kimberlites, held at the Geological Society of America South-Central Section meeting in Fayetteville, Arkansas, April 1985. This reviewer was not present at the meeting.

Of the 24 papers of this volume, 18 present petrologic data (mostly original) and petrogenetic-tectonic interpretations of alkaline complexes from Indonesia to New Zealand. Five contain specific discussions of mantle metasomatic processes and the interpretation of metasomatized mantle nodules. The leading article by G.C. Ulmer and others is an interesting and very clear exposition of the technique of intrinsic oxygen fugacity measurements, and estimates of the mantle redox state. Twenty-five abstracts, collected at the end of the book, further indicate the scope of the symposium, but were all previously published.

The petrology of alkaline bodies of Texas, Arkansas, and Kansas (11 papers) is emphasized, and the student of alkaline rocks of the southeast U.S. will find this an extensive, fairly well-indexed reference source. An exhaustive chronological bibliography of the igneous rocks of Arkansas (A.J.A. Janse and P.A. Sheahan), with emphasis on diamond occurrences, is a useful addition in this respect.

The five papers that deal specifically with mantle

metasomatism too thinly cover a broad range of topics, and the book doesn't quite live up to the first half of its name. Serious students of mantle metasomatism will find better compilations elsewhere, although non-specialists will find some useful summaries. For example, the model for mantle metasomatism by H.G. Wilshire is largely expounded in previous publications and contains few original elements, but is a useful compilation and review of many fundamental observations. Some original experimental data by J.K. Meen on carbonatite-peridotite reactions at high pressure help to make this volume more current.

The book will be most useful to students and professionals interested in the interpretive petrology of alkaline rocks, especially of the southeast U.S. The overall quality of the book (editing, writing, printing, etc.) is excellent. Figures are large and usually well-drafted (there are some glaring computer-generated exceptions). The book is printed on 8.5 × 11 paper of good quality.

Tony D. Peterson
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Thermodynamic Modeling of Geological Materials: Minerals, Fluids and Melts. I.S.E. Carmichael and H.P. Eugster, editors. Mineralogical Society of America, Reviews in Mineralogy, Vol. 17; 1625 I St NW, Suite 414, Washington, D.C. 20006, U.S.A., 499 pages, US\$18.00/\$12.00 (nonmember/member MSA).

This is another volume in the Reviews in Mineralogy Series published by MSA. The editors and authors presented a short course, with the same title as this volume, on October 22–25, 1987, at the Wickenburg Inn, Phoenix, Arizona. The course itself was very good, and the published volume is even better because it permits review and synthesis of the material presented.

As with many review volumes, it is sometimes difficult to relate the various chapters to each other. The authors approach their topics in different ways, and in some cases use different vocabularies. The book does, however, divide nicely into three sections: the first three chapters, by Newton, Navrotsky and Wood, deal with solids; the next several, by Pitzer, Wear, Sverjensky, Holloway, Brimhall, Crerar, Ferry, Baumgartner and Eugster, deal with fluids; the last three, by Berman, Brown, Ghiorso and Carmichael, concern melts. The basics of thermodynamics provide a common foundation for the three sections of the book, although in some cases the foundation disappears behind mathematical formalism. If there is any major flaw with the book it is just that: too many equations with too many greek

letters and too little explanation make comprehension of some of the chapter difficult.

The chapters on solids form a nice group. Chapter 1 (Newton) tells how data are obtained, Chapter 2 (Navrotsky) explains solid-solution mixing models, and Chapter 3 (Wood) shows how it can all be put together to derive large, consistent, thermodynamic data-sets. Chapters 4 (Pitzer), 5 (Weare) and 6 (Sverjensky) provide the basic equations for thermodynamic analysis and modeling of low-temperature aqueous solutions. Sverjensky's contribution is especially clear and understandable, and Weare's discussions of Permian, Miocene and present-day evaporites are quite interesting.

Holloway (Chapter 7), Ferry & Baumgartner (Chapter 9) and Eugster & Baumgartner (Chapter 10) provide general introductions to the chemistry and theoretical treatment of fluids at elevated P and T. Their discussions of C-O-H systems demonstrate some applications of the theory to important geological problems.

Chapter 8, by Brimhall and Crerar, is reason all by itself to obtain a copy of this book. This chapter, concerning "Ore Fluids: magmatic to supergene," fills a large gap in the ore deposits literature. It may actually be out of place in this collection of thermodynamic papers, but it provides an excellent and complete discussion of ore fluids and processes. Anyone who teaches an ore deposits course will want to use this as a reference because it puts together many concepts that hitherto were scattered throughout the literature.

I didn't get as much out of the last three chapters, on magmas, as I did the other parts of the book. Perhaps it was because Berman, Brown and Ghiorso were mostly concerned with presenting models and mathematical treatments for the thermodynamics of melts, a subject with which I am not terribly familiar. Ghiorso and Carmichael, however, give some interesting petrologic applications, indicating clearly the importance of building up our thermodynamic data-base for igneous materials.

In summary, this is an excellent book, well worth having on your shelf. Not only does it provide a good reference for the basic thermodynamics of minerals, fluids and melts, but it is a useful teaching tool, especially at the graduate level. The up-to-date examples are all excellent and provide sufficient respite from the complex theory and formalism.

Dexter Perkins
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Igneous Petrology. By A. Hall. John Wiley & Sons, New York, 1987, 573 pages, \$51.95.

Dr. Hall has produced a clearly written and gener-

ally up-to-date book that will provide a useful option as a text for an undergraduate class in igneous petrology or for a general reference book in the non-specialist's library. In either case, as the author implies in the introduction, the book assumes some familiarity with the petrography and classification of igneous rocks and thus may need to be supplemented by another text. Inclusion of some treatment of these topics, as is provided in the recent competitive book with the same title, by A.R. McBirney, might have avoided this. As a text for igneous petrology at the graduate level, the virtual absence of any thermodynamic treatment of igneous processes, and of chemical and mineralogical equations, makes it unsuitable.

Throughout, the text is extensively referenced and accompanied by clearly drawn maps and diagrams. Unfortunately, a number of the latter are not labeled as to units and, as is commonly the case, compositional coordinates are generally in wt. % rather than atom or mole % (the time for some author to make the conversion of many of the commonly used equilibrium diagrams from wt. % to mole % is long overdue). Generally, the references cited and the maps and diagrams used are up-to-date.

The order of presentation of material covered is logical, with *Chapter 1* dealing with present-day volcanic activity following the reasonable principle of the present being the key to the past. *Chapter 2* and *Chapter 3* deal with volcanism and intrusion, respectively. In both chapters, an initial treatment of interrelations among the compositions and physical properties of the magmas involved is followed by a systematic discussion of the character of the resulting activity and the type of rock and edifice or igneous body that is formed. *Chapter 4* deals with melting and crystallization in binary, ternary, and, to a minor extent, quaternary systems. Unfortunately, it lacks thermodynamic treatment of these topics, and little attention is paid to the effects of pressure, apart from P(H₂O), on solidus-liquidus relations. The treatment of the distribution of trace elements in magmas and igneous rocks in *Chapter 5* suffers from the lack of thermodynamic treatment; the purpose of its section on crystal-field effects suffers from the lack of treatment of factors relating to bond energies. *Chapter 6* deals with compositions and fractionation of stable and radiogenic isotopes in magmas and igneous rocks but, again, with no mathematical treatment; furthermore, the section on Sm-Nd dating and evolution is rather brief in terms of current interest in these topics. An extensive treatment of magmatic evolution in *Chapter 7* includes sections on crystal fractionation, liquid immiscibility, liquid fractionation, contamination, and mixing of magmas; it is unfortunate that, in the Skaergaard descriptions in the discussion of layered basic intrusions, the author uses diagrams and data from Wager

and Brown rather than those published more recently by McBirney and his coworkers. *Chapters 8 to 15* provide a systematic treatment of the principal igneous rock-types: basalts, granites, andesites, trachytes and phonolites, nephelinites and carbonatites, kimberlites and ultrapotassic rocks, alpine peridotites, and anorthosites; the chapters include information regarding typical compositions, descriptions of major occurrences and associations, and theories as to their origin. It is for this last part of his book that the author is particularly to be commended, since he provides, in one place, a large amount of useful information.

The choice of this book as a text or for one's personal library should depend on what emphasis is important. If the need is for a treatment of igneous (as opposed to both igneous and metamorphic) petrology with extensive descriptions of classic occurrences, then this book would be a sensible choice. If some thermodynamic treatment of many of the topics is desired, then *Igneous Petrology* by McBirney, which is similarly priced, should be considered. If a treatment of metamorphic rocks and processes as well as sections on petrography and classification are needed, then *Petrology of Igneous and Metamorphic Rocks (2nd Edition)* by Hyndman, at about 40% higher price, might be preferable.

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Compendium of Chemical Terminology. By Victor Gold, Kurt L. Loening, Alan D. McNaught & Pamil Sehmi. Blackwell Scientific, Oxford, 1987, 455 pages. US \$69.60 hardbound, \$48.45 softbound.

Chemical definitions up to the end of 1985 from the physical, inorganic, organic, macromolecular and analytical chemistry divisions of IUPAC (International Union of Pure and Applied Chemistry) have been assembled alphabetically in the first 449 pages. The Compendium is completed with references and a source documents list.

Each chemical term to be defined is given in capitals and underlined. A reference is given for the source of each definition. If the chemical term is identical to another chemical term, then the equivalence is given. When the chemical term contrasts with another chemical term, then the chemical term to compare is given. A few chemical terms that are now obsolete have been noted.

Some chemical definitions such as pH are long, to overcome the problem that the activity of a single ion is immeasurable. Other chemical definitions such as DTA are short and lucid, even though the technique is complicated. The Compendium also includes some unexpected definitions, such as schiller

layers. A comparison of the definitions of accuracy and precision clearly shows the difference. Although a semiconductor is defined, a term that is notably absent is *superconductor*. *Antiprismo* is defined as an affix to denote eight atoms bound into a rectangular antiprism, whereas a trigonal antiprism is far more common, especially in sulfides.

The quality of the English is high and exceedingly uniform. The print is easy to read, and the volume is well bound, with a gold cover to justify its nickname "the gold book". The price is reasonable. Mineralogists should have access to this Compendium so that chemical terminology is correctly used in the mineralogical literature.

Peter Bayliss
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The Grenville Province. Edited by J.M. Moore, A. Davidson, and A.J. Baer. Geological Association of Canada, St. John's, 1986, 348 pages, \$41.

This is another useful volume in the Special Paper Series from the Geological Association of Canada. It contains 22 different papers, which cover various aspects of Grenville geology, and is a welcome review of current work. The field and laboratory data-base in this enigmatic area has increased geometrically over the last ten years; this volume successfully synthesizes much of the critical work. The volume is divided into five major sections, dealing with: (1) regional aspects of Grenville geology, (2) the Grenville Front, (3) geochronology, (4) geophysics and geochemistry, and (5) models. These sections present a modern geological perspective of the Grenville Province and attempt comparisons with other orogenic belts. The volume will be a frequently used reference for any serious "tectonician" because it takes the Grenville Province from a previous "descriptive" stage into a serious, balanced structural view based on modern tectonic concepts. The book is typically well-produced with clear figures and a readable text. At \$41, it is more than a bargain in today's market and will certainly be one of the most successful in the Special Paper series.

R.D. Dallmeyer
University of Georgia

Marine Minerals: Advances in Research and Resource Assessment. Edited by P.G. Teleki, M.R. Dobson, J.R. Moore, and U. von Stakelberg. Proceedings of the NATO Advanced Research Workshop on Marine Minerals: Resource Assessment Strategies held in Gregynog, Wales. (NATO ASI Series C: Mathematical and Physical Sciences Vol. 194). D. Reidel Publ. Co., Dordrecht, Holland, 1987, 588 pages, US\$99.

Every year sees more of the world's mineral reserves dwindle, providing a strong incentive to prospect in difficult and remote environments. Legal and jurisdictional developments, including recent U.N. Law-of-the-Sea statutes for marine minerals, have enhanced the desire for maritime nations to obtain reserve estimates within their offshore boundaries; in many cases this now extends 200 nautical miles offshore, unless constrained by the boundaries of other nations. *Marine Minerals* is therefore a timely publication addressing an important geological frontier, a frontier that is both costly and demanding. Offshore mining, by its very nature, has eliminated the individual prospector in place of consortiums of research institutes and mining companies. *Marine Minerals* discusses the occurrence and origin of four classes of deposits, *i.e.*, placers, phosphorites, manganese nodules and crusts, and metaliferous sulfides. It also sets out to provide the status of surveying and measurement techniques, the status of resource-assessment methodologies, and the needs of those who may eventually exploit the mineral wealth of the oceans.

The book consists of thirty-two contributed papers of variable quality and length and prepared through an author photo-ready format that has become common for many of today's workshop publications. The highlight of the book is the set of working-group reports, organized around the four classes of marine mineral deposits. These executive summaries provide a coherency and synthesis of the varied disciplines represented at the workshop, which included geologists, geochemists, geophysicists, mineral economists, oceanographers, and mining experts. The reports provide important recommendations that, if followed, should provide systematic advancement to offshore mineral exploration.

On the other hand, few of the contributed papers are of sufficient length or depth, or contain more than a provincial reference list, to be classified as review papers. For example, none of the papers on manganese nodules made reference to the highly significant Soviet research on this topic (interesting, considering that the same publishing house recently produced a comprehensive text by G.N. Baturin on "The Geochemistry of Manganese and Manganese Nodules in the Ocean"). The section on marine placers is the most discouraging, lacking an adequate presentation on the mineralogy and the sedimentology of these deposits. The chapters on sulfides and phosphorites are more impressive and provide sufficient information for reference material for a university course. I was most impressed with a chapter outlining the rationale for establishing an ocean-bottom observatory at a spreading ridge-crest. The section on resource assessment and geostatistics demonstrates the field of marine minerals as a truly frontier subject-area, freely mixing old established

methods with fresh and untested approaches.

Marine Minerals is a well-edited book that combines the wisdom of industry, government and university scientists under one cover. By covering such a vast field, *Marine Minerals* is unable to treat fairly all subject areas, yet there is no competing text that does a better job. I highly recommend the text for professionals and students who are engaged or plan to become engaged in offshore mineral exploration. The editors freely admit that in this fast-moving era of discoveries and developments in the oceans, *Marine Minerals* could soon be superseded by results of exciting new findings. Yet, I believe that they have organized a timely workshop and produced a worthwhile text that provides excellent value for the money.

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En visitant les grandes collections minéralogiques mondiales. By C. Guillemin and J. Mantienne. BRGM editions. B.P. 6009, 45060 Orléans Cedex 2, France. 248 pages, 100 FF (soft cover).

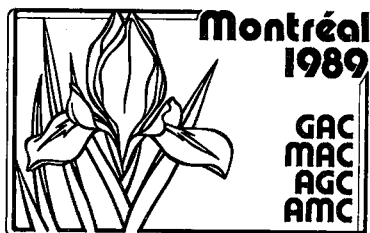
Mineral specimens form part of mankind's heritage, and must be protected, either for their scientific or economic interest, or because of their aesthetic value. In this book, a veritable "tour de force", Guillemin and Mantienne have rated, admittedly using subjective criteria, the principal mineralogical collections of the world. This compilation of gastronomic delights of the mineral kingdom updates and complements earlier editions published in 1964 and 1972. The authors based their evaluation on visits of necessity made at different times over the span of three decades. Another shortcoming in their approach is the limitation that only what is on display can be evaluated. In spite of these difficulties, they have succeeded in listing, for each collection, the best specimens that a visitor could expect to find on his visit. Like in a *Guide Michelin*, the specimens are rated using one of three categories: exceptional, excellent (with "world beaters" in italics in both categories) and very good. The collections visited, which number 113, are presented alphabetically. Thirty-five countries are represented. For each museum, a full address, a brief history and a summary of current holdings are provided. The years each museum was visited are noted. European museums obviously were visited more frequently and more recently than those further afield. A brief description (size, provenance and, where available, acquisition number) is provided for each entry. Cut stones and objets d'art gene-

rally are not included. Rough sketches are provided for the most striking specimens. In the authors' opinion, the following institutions, listed alphabetically, house the world's ten best collections: American Museum of Natural History (New York), British Museum of Natural History (London), École nationale supérieure des Mines (Paris), Harvard University Museum (Cambridge), Institute of Mineralogy (Freiburg School of Mines, West Germany), Fersman Museum of the Academy of Sciences (Moscow), Natural History Museum (Prague), Museum national d'Histoire naturelle (Paris), Natural History

Museum (Vienna), and the Smithsonian Institution (Washington).

The authors are to be congratulated for a most informative document, which, like a valued guidebook for the tourist, will allow amateurs and professionals alike to better plan their visits. Furthermore, the compilation will alert curators to the true potential of their holdings, and politicians, who ultimately control the purse strings, to the need for adequate conservation of this legacy for future generations.

Robert F. Martin



BURIAL

DIAGENESIS

**ORGANIZERS: IAN HUTCHEON
REINHARD HESSE**

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This short course is intended to acquaint geologists with recent advances in rock-water-organic matter interaction during burial diagenesis. The program provides an overview of organic diagenesis, inorganic-organic interactions, prediction of porosity loss, diagenetic mineral reactions, isotopic methods, water-rock interaction and modelling of fluid and mass transfer. Case histories of applications of these techniques will be presented. Computer programs to assist in modelling and water-rock interaction will be introduced and micro-computers will be available. Students are encouraged to bring data from their own work, including petrogenetic sequences, water analyses, isotopic data and organic maturation data. This two day course will include the instructors and topics below and a complete set of course notes:

Evolution of porosity - - - - -D. Gautier, US Geological Survey
Organic matter and thermal evolution - - - - -L. Snowdon, Geological Survey of Canada
Organic petrography and diagenetic modelling - - - -R.M. Bustin, University of British Columbia
Integrated maturation/diagenetic modelling - - - -R.C. Surdam, University of Wyoming
Isotopes in diagenesis - - - - -F. Longstaffe, University of Western Ontario
Analytical methods - - - - -P. Lundegard, Unocal Ltd.
Water-rock interactions - - - - -I. Hutcheon, University of Calgary
Diagenetic modelling of geochemistry and fluid flow - - - -J.R. Wood, Chevron Oil Field Research
Diagenesis of North Sea Jurassic reservoir - - - - -M. Thomas, Elf Aquitaine (SNEAP)
Thermal history of a passive ocean margin - - - - -F. Walgenwitz, Elf Aquitaine (SNEAP)

The short course registration fee is \$250 (Cdn) for professionals and \$150 (Cdn) for students. The course will be held on May 13-14, 1989, prior to the GAC-MAC annual meeting, in the Department of Geological Sciences at McGill University, Montreal, Quebec, Canada. For more information and application forms, contact:

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ECONOMIC GEOLOGY
and the
Bulletin of the Society of Economic Geologists

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