

## BOOK REVIEWS

*Mountains and Minerals, Rivers and Rocks – A Geologist's Notes from the Field.* By M. Dane Picard, Chapman and Hall, 29 West 35th Street, New York, N.Y. 10001-2299, 1993, 167 pages. US\$17.95 (ISBN 0-412-03741-4) (paperback).

This book is a combination of autobiography and travelogue assembled from a potpourri of various excursions. All nineteen essays in this book are previously published, most of them in the *Journal of Geological Education*. They fall into four sections. Essays in the first section, entitled "The Oil Patch", deal with Picard's attempts, as a student, to break into geological employment; in this reviewer's mind, it is recommended reading for geology students today with the same objective.

The essays in the second section, "Academe", will be readily appreciated and enjoyed by most faculty members, especially the one on "Appointments and Reappointments", because of Picard's delightful sense of humor, which is evident throughout the entire book.

The third section, "In the Field", includes "A Mine Dies", and describes Picard's experiences during a visit to Noranda's mine in Park City, Utah, at the time of its closing in 1982. His description gives the reader a picture fairly typical of "hard rock" mines in general.

The fourth and final section of essays is entitled "On the Road". Here are described geological features in France and Italy, especially the latter. Titles include "Down the Durance in France", "On the Beach at Elba", "Through the Dolomites and Apennines", and "The Sea at Portovenere".

This reviewer found especially interesting some shocking details of the catastrophic flood of October 9, 1963, "...that swept over the crest of the Vaiont Dam east of Longarone . . . about 90 million cubic feet of mountain slid down steep slopes at 60 miles an hour into Lake Vaiont, a deep reservoir behind a dam in the Italian Alps". Picard gives considerable detail on the geology, the extent of the damage, and the lives lost. His comment: "From the outside, one might conclude that in Italy, as everywhere else, dam engineers don't pay attention to geologists". And finally, "Later in Salt Lake, Chad Gourley told me the Italians sent the engineers to prison after the Vaiont flood. He did not know whether or not any geologists accompanied them. Geologists and engineers studying dam sites seldom consider the prospect of prison in the course of their studies". Makes one think, doesn't it, in these times of

accreditation in the discipline. Good bed-time reading.

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*The History of Mineral Collecting.* By Wendell E. Wilson. The Mineralogical Record, P.O. Box 35565, Tucson, Arizona 85740, 1994, 264 pages. US\$24. softbound (ISBN 0026-4628).

In his introduction, Wendell Wilson writes that, seventeen years ago, when he first began assembling materials for what eventually became this richly illustrated and exhaustively comprehensive labor of love, he had intended merely to write a historical opening chapter to a proposed "Handbook of Mineral Collecting". "I had not known what I was getting into", he confesses. "Much of the existing literature, it turned out, was in German, French, Dutch, Spanish, Italian, Russian, Swedish, Danish, Slovakian and Latin. Furthermore, many of the earliest and most important works were so exceedingly rare that in most cases no copies were conveniently available for study." Once aware of its complexity, Wilson at first was daunted, and the project for the moment shelved.

Yet, in the meantime, academics and antiquarians were becoming increasingly drawn to study early collections and collectors of natural science, as first roots in the evolution of museums. Research papers and conferences on collecting shaped a more manageable overview, sources became better accessible, and Wilson went back to work.

This is fortunate not only for the mineral-mad themselves, but also for their wives and other loved ones in quest of an appropriate gift, for *The History of Mineral Collecting*, thanks to its multitude of historical photo reproductions ranging from catalogue title pages in Latin language and gothic script to mineral illustrations in watercolor, is as much an optical delight as it is an impressive assemblage of information. Published to commemorate the 500th birthday of Georgius Agricola, the book presents in detail no fewer than eighty notable early collectors, beginning with Agricola and ending with George Gibbs, who died in 1833, by which time the great private collections had pretty much given way to the

growing institutional presence of modern public museums.

Along the way, we learn that collecting natural science specimens of any (and all) kinds originated as a kind of preening pastime among the aristocracy, who assembled "rarities" of every description, from works of art to hairballs from cows' stomachs. A successful collection was comprehensive, presenting as it were a universe under glass. Word of such collections spread far and wide, adding to the esteem of the court in question. From the beginning, medical men were disproportionately represented among the non-noble. Agricola himself was a medical doctor, as, for that matter (but much later and outside the scope of this book) was the enigmatic Abraham Gesner, Canada's pioneering but chronically unsuccessful geologist, whose collection of natural science specimens subsequently formed the basis for the New Brunswick Museum, this country's first public museum of natural science.

In addition to the eighty who are presented in detail, no less than 1,200 collectors are each given a brief biographical paragraph in a comprehensive overview section near the end of the book, which also includes a bibliography of some 300 historic mineral collection catalogues. If there is one drawback, especially for the reader whose level of interest in mineral collecting has not yet attained full evangelical fervor, it is that the *History of Mineral Collecting* is essentially a book of lists. When I was at the Munich Show some years ago, I remember the first superlative aquamarine as something of a revelation, the second as interesting, and by the third, fourth and fifth, the superlative had become as commonplace and had lost its capacity to impress. In fact, the whole thing became downright boring, a view which the public seemed to share, for the only display table around which people actually clustered in rows three and four deep was the one where someone was cracking open geodes with a pair of power tongs. Here something was happening, beyond simple static display. And while you wouldn't expect a history of mineral collecting to offer the progression of plot and character development of a Sam Spade novel, the cumulative impact of so many collectors presented one after another does amount to a kind of surfeit, in the midst of which it comes as something of a relief to learn that the fifteen children fathered by the British aristocratic collector Sir John St. Aubyn (1758-1839) were every one of them illegitimate.

The solution of course is rationed reading. This is the kind of book you'll want to go back to again and again, year after year. Try doing it all at once and you may be fatigued by information overload. Leave some of the chocolates in the box for tomorrow.

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*A Color Atlas of Rocks and Minerals in Thin Section.* By W.S. MacKenzie and A.E. Adams. John Wiley & Sons, Inc., Somerset, New Jersey 08875-1272, U.S.A., 1994, 192 p. US\$29.94, paperback (ISBN 1-874545-17-0).

This is a small (15 × 21 cm) member of a series of paperback atlas volumes on petrography compiled by Prof. W.S. MacKenzie and various collaborators. Earlier works dealt with narrower subjects: rock-forming minerals (1980) and igneous rocks (1982).

The book here under review is divided into five parts: Optical mineralogy, Minerals, Igneous rocks, Sedimentary rocks, and Metamorphic rocks. No references are given, but a complete index is offered. Each part of the book is illustrated by beautifully printed large colour photomicrographs, mostly measuring 8 × 12 cm. The exceptional clarity of these illustrations is the result of their having been prepared from oversize (6 × 9 cm) transparencies taken with a Zeiss Ultraphot microscope.

The Preface states that "this atlas has been prepared for students of earth science, geology, mineralogy and physical geography who require a text for practical classes . . ." and that the "book's prime purpose is as an introduction to the subject for college and university students . . ." Clearly, the atlas is too brief and superficial to fulfill these goals.

Typographical errors seem absent, but there are errors of fact and interpretation. For example, not all opaque minerals are black (p. 14). Corundum does not have the highest indices of refraction of all rock-forming minerals (p. 18). The reasons given for having chosen Westerly Granite, G-1, as an analytical standard, are misstated (p. 92). The definition of metasomatism is inadequate (p. 153), and kyanite is not an indicator of "the highest grade of the amphibolite facies" (p. 178). Titanite is listed as sphene and given an incorrect formula (p. 186). The inclusion of anorthosite with the metamorphic rocks seems odd (p. 184). Eclogite is a particularly stunning rock in thin section. It is unfortunate that the authors chose a grundgy, altered example (p. 187).

The printing of bar scales with the photomicrographs, rather than giving enlargement factors (×9, ×16, and so on), would have been desirable. Presenting the identical full-page birefringence chart twice (pages 6 and 23) seems a waste. My severest criticism of presentation, however, is reserved for the book's layout. The equivalent of more than 40 pages of this slim volume are blank. Some pages of text carry no more than four or five lines. How such poor layout could have come about in our age of computer composition really mystifies this reviewer.

In spite of some harsh words, I recommend this book, though for a purpose not stated by its authors. I encourage geologists and mineralogists, each and all, to buy a personal copy of this beautiful and reasonably

priced volume. Keep it not in your office or lab, but at home, to show to non-geologist and non-mineralogist social visitors. It will give them a good view of the extraordinary visual beauty of one aspect of our science.

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*Handbook of Mineralogy. II. Silica, Silicates.* By J.W. Anthony, R.A. Bideaux, K.W. Bladh and M.C. Nichols. Mineral Data Publishing, P.O. Box 37072, Tucson, Arizona 85740 U.S.A, 1995, xiv + 904 pages. US\$135 + \$7.50 shipping. ISBN 0-9622097-1-6.

This is the second volume (published in two parts that total 904 pages) of a proposed five-volume series to cover the mineral kingdom. The first volume (Elements, Sulfides, Sulfosalts) was published in 1990 and reviewed in *The Canadian Mineralogist* (29, 175-176; the reader is referred to that review for background information that I shan't repeat here).

The volume opens with two pages of Acknowledgements. Here, on the fifth line, I found the sole typographical error to catch my eye. It should be Cornelis Klein (Cornelius was his co-worker of many years at Harvard). A ten-page Introduction follows, and includes a table of the chemical elements and a summary of the recent (1978) IMA nomenclature of amphiboles. One then passes directly to the minerals, which are arranged alphabetically, each on a single page, from abschwabachite to lamprophyllite (in part 1), and lāngbanite to zussmanite (in part 2).

*Silica, Silicates* is an outstandingly useful work. However, it is at the same time arid and could, in my view, be improved. Let me begin on the down side.

The volume's aridity is no more than a measure of our age. A computerized typesetting system effectively has isolated the human hand from the printed page. To appreciate this, I invite the reader to compare the result with Dana's last (7th) edition. Surprising is that the advantages of the computer were not put to use. Examples are afforded by the slavish use of a single type size, and by the large number of chemical compositions given in split and hard-to-follow columns. Those compositions would have better been printed in unbroken columns, with the references given in short lines off to one side, perhaps in small type. No space would have been lost in adopting such a reader-friendly layout and, in fact, additional compositions could have been given.

Why was the IMA nomenclature of pyroxenes (*American Mineralogist*, 73, 1123-1133; *Can. Mineral.* 27, 143-156) excluded? Omission from the listing of such old friends as acmite, hypersthene and salite demonstrates that the pyroxene purge was known to

the authors at the time of writing. Also, a few notes (with diagrams?) giving summaries of the nomenclature of chlorites, clays, feldspars and so on would help to guide many readers. Then, I ask if it would not have been advantageous to list minerals under groups? Aluminosilicates, amphiboles, chlorites ... zeolites, others. This would require an index, something that is absent in the current self-indexing volume.

Finally, "about half of the [900+] minerals are known from only a single locality" (Introduction, p. vi). Thus, the reader must swallow hard to accept that quartz, orthoclase and biotite (for example) are given no more space than are clinotobermorite, pitiglianoite, and so many other rarities.

Now to the up side. This is an immensely useful reference work, always keeping in mind that it "presents data, not the background necessary to use or understand it" (Introduction, p. v). Between four covers, one has an unprecedented concentration of mineralogical information. *Silica, Silicates* constitutes a basic fount for collectors and amateurs, and a pivotal starting gate for researchers and professionals. For the mineralogical and petrological fraternity, this volume will quickly assume the role of a standard essential reference.

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*Glossary of Mineral Species 1995.* By Michael Fleischer and Joseph A. Mandarino. The Mineralogical Record, P.O. Box 35565, Tucson, Arizona 85740, U.S.A. 1995, 280 p. US\$18.00 spiralbound.

Few mineralogists in North America, be they professionals or serious amateurs, are unfamiliar with the *Glossary of Mineral Species*, published by the Mineralogical Record over the past 24 years. The edition here under review is the seventh.

The most recent edition of the *Glossary* on this reviewer's book-shelf is the third, published in 1980. The latest edition follows the format of my yellowing antique. Basically, it is an alphabetical listing of valid mineral species (now about 3600, some 400 more than in 1980). Separate entries for polytypes have been eliminated. For each mineral, its name (in boldface) is followed by chemical formula, crystal system, colour (if distinctive), and a significant reference from the literature. For some entries, a statement of the mineral's relation to other minerals or groups is given. Varieties, synonyms, and discredited minerals are in the list, but in ordinary type. A tabulation of 100 mineral groups concludes the text. A short introductory statement that summarizes the characteristics of each group is followed by an alphabetical list of its members. The chemical formula is given for each member, a vast improvement over earlier editions, where the names

stood alone. An appendix (by John S. White, Jr.) listing word formulas for some 260 common minerals is of particular use to collectors.

This review would be incomplete without a few words about the remarkable senior author, Dr. Michael Fleischer. Sole author of the first five editions of the *Glossary*, Dr. Fleischer is one of the world's most acute and widely published mineralogists. Since 1984, following a distinguished career at the U.S. Geological Survey capped with a Roebling Medal, Dr. Fleischer has been at the Smithsonian's Department of Mineral Sciences. Recently past his 87th birthday, he still puts in two full days a week carrying out the disciplined research and writing that have been the hallmarks of his professional life.

If you work with mineralogy in any capacity, and don't have this reference work, buy it! If you already possess an earlier edition, buy a copy of the seventh. The chemical formulas listed with members of the mineral groups alone make the purchase worthwhile.

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*Ore Elements in Arc Lavas.* By R.L. Stanton. Oxford University Press, Oxford Monographs on Geology and Geophysics No. 29, 1994, 391 pages. CDN\$255 (hard-bound), (ISBN 0 19 854050 7).

The genesis of volcanic massive sulfide deposits has probably attracted more attention from geoscientists than any other type of ore deposits. Within the last quarter of a century, thousands of articles related to these deposits have been published. In view of such scientific interest in the subject, it is surprising that there are still significant gaps in knowledge on the geochemistry of principal ore metals such as copper, lead and zinc in volcanic island-arc rocks that host massive sulfide deposits in ancient terranes. In fact, compared to many trace and minor elements, there is little systematic documentation of the distribution of these ore elements in island-arc lavas. Thus, it is encouraging to see a new book that focuses on the geochemistry of these elements in island-arc lavas, particularly on their behavior during processes of magmatic differentiation. The book also deals with a long-standing controversy about whether these exhalative ore deposits are derived from the melt by magmatic processes or by much later leaching of rocks by seawater.

The book is mainly based on the author's extensive studies of the Solomon Islands (Pacific Ocean) and marshals an impressive body of new major- and trace-element data on whole rocks and minerals from these islands. The contents are well laid out into twenty-four chapters, which can be grouped into three sections. The

first five chapters are introductory and summarize the background information on exhalative ore deposits in arc environments, including the evolution of hypotheses concerning their origin, the currently accepted models, and the resulting controversy. The final chapter of this section describes the petrology and geochemistry of the volcanic rocks of the Solomon Islands. In the next section, the author devotes a chapter to each of fourteen elements: copper, zinc, lead, barium, strontium, phosphorus, calcium, titanium, vanadium, chromium, manganese, iron, cobalt and nickel. The concentration of these elements in marine volcanic rocks in general (including mid-ocean ridge basalts and island-arc suites) is reported and compared to their behavior in the Solomon Islands lavas. The author also describes their abundances in constituent minerals. The concluding chapter of this section gives a cursory overview of the geochemistry of fifteen other elements (S, Cl, F, Rb, Zr, As, Sb, Bi, Mo, Au, Ag, Cd, Ga, W and U), which provides an additional data-base from which current genetic interpretations are subsequently discussed and critically evaluated. The factual background for individual elements also includes a comprehensive survey of the relevant literature. The third section deals with the behavior of the aforementioned elements during fractional crystallization and in volcanic exhalations, and concludes with chapters on the genesis of lavas of the Solomon Islands and the ore deposits. Contrary to much current opinion, the author concludes that the metal contents of hydrothermal fluids are mainly derived from fractionating subvolcanic magmas rather than by later leaching of volcanic rocks by hydrothermal fluids.

Professionals involved in research on volcanic massive sulfide deposits or the geochemistry of island-arc rocks will find this book an interesting case-study and a valuable source of geochemical data on modern arc lavas as well as an extensive review of theories concerning the genesis of related deposits. It is clearly written and presents the material at a level that is accessible to those who do not have extensive geochemical or petrological backgrounds. In the tradition of other Oxford Press Monographs, the book is well edited and has a high quality of text and figure presentation. Regrettably, because of its steep price, this book will find its way mainly into the collections of well-endowed libraries. Nevertheless, the author's unorthodox conclusions could stimulate much discussion, and thus the book would be particularly valuable as a reference text in a graduate course in economic geology or geochemistry-petrology. It provides some intriguing insights on these topics by a man who has devoted himself to the study of mineral deposits during his long, distinguished career.

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