The Canadian Mineralogist
Vol. 35, pp. 1353-1358 (1997)

BOOK REVIEWS

Photographing Minerals, Fossils and Lapidary Materials. By Jeffrey Scovil. Geoscience Press, P.O. Box 42948, Tucson, Arizona 85733-2948, U.S.A., 1995, 224 pages. US$40 hardbound (ISBN 0-945005-21-0).

We who collect minerals because we find them attractive, from time to time want to share this attractiveness with others. So we perch the specimen on a swatch of felt or velvet beneath the desk lamp and click off some hopeful exposures. The result, commonly, is that the more reflective crystal faces turn out looking terribly overexposed. Those diagnostic striations... where did they go? And that fuzz, is that the vug containing delicate whiskers of natrolite?

Photographing minerals, as anyone who has tried it will attest, is difficult and frustrating. A person with photographic training may well be able to puzzle out specific techniques on first principles. For the rest of us, help is at hand in Jeffrey Scovil's book. To photograph like Scovil does requires specialized equipment...thousands of dollars of it, and an intimidating attention to detail. Just to give one example, taken from the book, of the technical lengths to which a professional mineral photographer goes, here is what can be done to minimize vibration: "The table you use should be heavy and well braced. If possible, the floor should be concrete. If it is a wooden floor, it should be on the ground floor and not near anything that will cause vibration, such as a refrigerator or a furnace...for a vibration proof table to shoot on, start with a solid, thick-topped table on which you place a dense rubber cushion, such as a typewriter pad. On top of the pad, place a quarter to half inch thick steel plate, then another cushion. Finally, place a one to three inch thick slab of rock. The rubber cushions stop short, sharp vibrations, and the steel and rock reduce rolling vibrations of longer wavelength.

With this book as guide, a person with a moderate amount of patience, a reasonable familiarity with photography, and, perhaps, a talent for improvisation to get around the more costly professional equipment, will be far better enabled to come up with photos that get the best out of one's own technical accoutrement. Not only does Scovil know what he is talking about, he made the photos for a Fabergé exhibit in Moscow, and his photos appear frequently in *The Mineralogical Record, Earth Magazine, Lapis,* and other publications; he also knows how to convey information straightforwardly, understandably, and point by systematic point. The seventeen chapters are comprehensive, covering, to name just a few, lighting techniques, magnification, backgrounds, micro and stereo photography, photographing fluorescent minerals, gemstones and fossils, and photographing on location. There is a chapter devoted to better slide presentation. Clear precise diagrams support clear precise text. *Photographing Minerals, Fossils and Lapidary Materials* is illustrated with over 150 of Scovil's own images, plus selections from other world-class mineral photographers.

Are there reservations? Sorry, I cannot oblige. Scovil's book is so useful, and satisfies such a lack, that any quibble would be trivial in the balance. You'll get years and years of use from this invaluable book.

Hans Durstling
62 High Street
Moncton, New Brunswick E1C 6B3

The Amber Book. By Åke Dahlström and Leif Brost (translated from the Swedish by Jonas Leijonhufvud). Geoscience Press, P.O. Box 42948, Tucson, Arizona 85733-2948, U.S.A., 1996. 134 pages, US$27. ISBN 0-945005-23-7.

Amber holds a particular fascination for scientist and layman alike. This is due in part to the beauty and "warmth" of the substance itself, and in part to the bits and pieces of ancient life entombed as inclusions that offer miniature windows to long-lost worlds. Four events have recently catapulted amber to special prominence. The most outstanding was the publication of Michael Crichton's "Jurassic Park" (followed by Steven Spielberg's film version), where DNA from the blood of a dinosaur was extracted from the gut of a mosquito entombed in Dominican amber (of Eocene age!). Then, the startling beauty of amber was displayed in a major exhibition last year at the American Museum of Natural History in New York City. On a more scientific slant, the possibility that bubbles in amber preserve tiny samples of ancient atmosphere was hotly debated by geochemists in the late 1980s. Finally, in 1995 the claim was made on the pages of *Science* (v. 268, p. 1060) that bacteria encased in 25-Ma-old amber could be revived.

The Amber Book rides the crest of the wave of renewed interest in amber. The book is translated from the Swedish, where it bore the title "Stones that float and burn." It is a thin overview of the subject that, in the words of the publisher, offers "a basic source of knowledge for anyone who appreciates amber, including jewelry buyers and art collectors." The text is a bit of a potpourri, a somewhat rambling sequence of facts and views with neither a logical thread nor order. The reader is further challenged by an absence of a table of contents or an index. Nevertheless, with patience, one is able to piece together the story of amber, from its scientific (and etymological) origins to its age and varieties, its exploitation and uses through the ages, and so on. A table lists "facts about the more important kinds of amber" (and copal), and lists are given of amber artists and amber collections. A bibliography of 35 books and seven articles (mostly from obscure journals) is offered.

This is not a book that will enrich the mineralogist's expertise. Worse, the text is misleading in places. Two examples: 1) Dinosaurs did not die out in the Oligocene (p. 13), and 2) "In the Dominican Republic, amber is found in mountain craters at an elevation of 1000 m. The stones are embedded in seabed sediments that have been overturned several times and ended up on the tops of mountains" (p. 55). Gymnastic tectonics, I suppose.

The heavy hand of a practised editor was lacking in the preparation of *The Amber Book*. Apart from an awkward text (partly the result of a translation uncorrected by a geologist or mineralogist), the poor coordination of text with illustrations, and the lack of scale on photographs of unfamiliar objects will baffle most readers. For those unfamiliar with the geography of the Baltic area, southern Sweden, or Denmark, the unlabeled maps will be opaque. Text layout is spotty, with unexpected insertions (such as the poem on p. 64) and interruptions (the text on p. 57 is continued on p. 133).

In sum, this is not a book of use to the professional. It is designed for a general audience. Even here, however, it falls shy of its intended purpose owing to weak editorial handling.

Thomas Feininger
Départment de géologie,
Université Laval,
Québec, Québec G1K 7P4

Franklin and Sterling Hill, New Jersey: The World's Most Magnificent Mineral Deposits. By Pete Dunn (self-published). Five volumes, available from the Franklin – Ogdensburg Mineralogical Society, P.O. Box 146, Franklin, New Jersey 07416, U.S.A., 1995, 755 pages. US$30 each volume, US$150 for the five volumes (plus shipping and handling). Softbound.

In this imperfect world, it would be difficult to find another person who can match the massive expertise with which Pete Dunn relates the mineralogy and history of the famous Franklin and Sterling Hill zinc ore deposits of New Jersey. In his preface, Dunn says, "A vast amount of scientific work remains to be done, but this seems like a reasonable time to punctuate my research efforts ... pause, and share most of this magnificent story. This effort is an attempt to set out what happened here in an expository manner."

And that is precisely what Dunn does. It is in fact a story. It runs naturally and smoothly from early developments through a consideration of the mining industry in its flourishing period, to detailed consideration of individual minerals, both the common ones and the rare. Approximately ten percent of all known mineral species are found here, a claim which, says Dunn, cannot be made of any other locality on earth. More mineral species have been described from this locality for the first time than from any other. About ten percent of the minerals found in these deposits are unique.

Dunn's exhaustive portrait of these famous mineral deposits is a twenty-year labor of love, self-published in five large volumes, on typing paper, 8 1/2 by 11 inches. Each volume totals *ca.* 160 pages. But do not let that paper detail lead to images of kitchen-table work, of fuzzy mimeographed pamphlets. On the contrary. Typography is crisp, clear, and eminently readable. Extensive and excellently reproduced black and white photographs and drawings, including historical photos of miners and mining facilities, mineral photos, detailed drawings of crystal morphology, and photomicrographs that are stunning, even in black and white, document every aspect of the occurrence. Here, the absence of color is no liability. Good color mineral photographs require specialist mineral photographers; color reproductions, good or bad, are prohibitively costly for a self-published work, and if to save cost, only a few were included, these few, by calling attention to themselves, would detract from the work's overall unity of appearance.

Volume one opens with an extensive bibliography, and follows with a history of Franklin and Sterling Hill mining. Volume two continues this history and moves on to consider regional and local geology, the geology of the ore deposits, and mineral assemblages. Volumes three, four and five are devoted to detailed mineralogy, beginning with silicates and ending with a chapter on obscure and unnamed minerals.

This compendium is both comprehensive and highly readable. It will be of lasting value to mineralogists and other specialists, including industrial historians.

Hans Durstling
62 High Street
Moncton, New Brunswick E1C 6B3

Atlas of Alteration: A Field and Petrographic Guide to Hydrothermal Minerals. Edited by Anne J.B. Thompson and John F.H. Thompson. Geological Association of Canada, Mineral Deposits Division, Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, 1996, 119 pages, CAN$55 soft cover (ISBN 0-919216-59-5).

This book consists mainly of 49 colored photographic plates, each of which faces a compact page of text. Most plates consist of four photographs, which illustrate an alteration feature ranging from outcrop to microscopic scale. Each page of descriptive text gives the chemical formula for the main mineral, the deposit and alteration types where the mineral is important, characteristics of the mineral in hand specimen and thin section, a brief insightful discussion of its significance, several pertinent literature references, concise descriptions of the photographs and photomicrographs, and the name(s) of the contributor(s).

The editors have done an admirable job of melding the examples from 36 contributors into a consistent pattern for the 40 featured minerals. In addition to the plates and texts relating to them, there are four introductory pages dealing with methods for studying, classifying, and interpreting alteration. There are 36 general references on the subject. In a six-page table, alteration minerals are listed for various alteration zones in seven main types of deposit. A four-page table at the end of the book, arranged alphabetically, like the plates, supplies brief textural and qualitative optical information for 43 minerals.

No book of this size could be expected to cover all sorts of alterations, or the many variants of those that are presented. An illustration of classic radiating diaspore would be welcome. More zeolites could be featured in a future edition, along with prehnite and pumpellyite. Other geologists might submit garnet and tourmaline from other settings. The significance of epidote in basalt down section from copper deposits, such as those on the Keweenaw Peninsula and at Sustut, B.C., could be more clearly featured. Many entries warn that similar-looking rocks may form in various ways. Additional cautions could include that jasperoid layers may form as near-surface "silica biscuit" in sequences characterized by alternating humid and arid seasons, and "garnet quartzite" may result from the metamorphism of aluminous quartz-rich clastic sedimentary rocks as well as from zones of siliceous aluminous alteration.

The photographs in the plates are sharp and in focus, and illustrate the intended features well. However, some colors seem a bit strange, for example, the mafic volcanic rocks in the photographs for cordierite and epidote. The book is solidly bound and is printed on good-quality water-resistant glossy paper, which should stand up to rough usage in field camps and core shacks. Overall, this is a very informative volume. Given the breadth of experience of the numerous authors, useful new information is assembled here for even the best travelled among the exploration and mining geological community. This Atlas of Alteration is a natural extension of the 1994 Geological Association of Canada Short Course Notes on Alteration and Alteration Processes Associated with Ore-Forming Systems. Ideally, sales of the Atlas will lead some individual, or group, to assemble a set of hand specimens to match the illustrations.

Donald Hattie
65 West Main Street
Sackville, New Brunswick E0A 3C0

Tectonic, Magmatic, Hydrothermal and Biological Segmentation of Mid-Ocean Ridges. Edited by C.J. MacLeod, P.A. Tyler and C.L. Walker. Geological Society, Special Publication **118**. Published by The Geological Society of London, The Geological Society Publishing House, Unit 7, Brassmill Lane, Bath BA1 3JN, U.K., 1996, 258 pages. US$108 (ISBN 1-897799-72-1).

This book is a collection of papers on tectonic, magmatic, hydrothermal and biological products and processes at segmented mid-oceanic ridges. Emphasis is on the role of ridge segmentation in tectonism, magma generation and injection, heat flow and hydrothermal fluid discharge, and the form and distribution of biological products, at both the regional and local scale. The book's greatest achievement is to provide detailed documentation of the geology of oceanic rifts using high-resolution multibeam acoustical systems, and of the close relationship between rift segmentation and magmatic, hydrothermal and biological processes. For example, it is now known with some certainty that the along-ridge morphology reflects major differences in the structure of sub-seafloor magma reservoirs, the extent and form of magma upwelling and, therefore, the circulation and composition of hydrothermal fluids. Because of the fundamental control of vent fluids on faunal communities with chemotrophic organisms forming the base of the food-chain, ridge segmentation also exerts a fundamental control on the types and evolution of organisms that colonize ocean ridges.

There are 15 papers, each with a preface by the editors and an index. The papers are organized into four major themes: tectonism (papers by Seméré *et al.*, Blondel, McAllister & Cann, Allerton *et al.*, and Lawson *et al.*), magmatism (Batiza, Robinson *et al.*, and Edwards *et al.*), hydrothermal systems (Haymon, German *et al.*, MacLeod *et al.*, and Zaykov *et al.*) , and biological products and processes (Southward *et al.*, Tunnicliffe *et al.*, and Nisbet *et al.*). The scale varies from the regional to local for all themes.

An excellent review by R. Batiza (Magmatic segmentation of mid-ocean ridges: a review) provides a context for new studies of segmentation processes at oceanic ridges. It is well known that tectonic and magmatic segmentation of ridges occurs at different scales, although there is debate on the cause of this segmentation. Batiza proposes that ridge segmentation is hierarchical, and that magmatic and tectonic segmentation are controlled by the physical and chemical properties of the mantle, especially how they influence mantle upwelling and melting. Another question addressed is the relative importance of horizontal *versus* vertical mantle flow, and melt emplacement in the extending crust. Along-axis lateral injection of dykes probably occurs, although how this lateral flow in the mantle interacts with magma upwelling is imperfectly understood. The paper by J.C. Semèré, B.P. West & L. Géli (The Southeast Indian Ridge between 127° and 132°40'E: contrasts in segmentation characteristics and implications for crustal accretion) uses the morphology of the Southeast Indian Ridge with an intermediate spreading-rate to show that the area within the Australian–Antarctic Discordance with deep seafloor is underlain by anomalously cold mantle and is therefore more similar to slow-spreading ridges. This suggests that mantle temperature rather than spreading rate is the main control on rift segmentation characteristics. E. McAllister & J.R. Cann (Initation and evolution of boundary wall faults along the Mid-Atlantic Ridge, 25-29°N) use high-resolution TOBI sidescan images to map boundary-wall faults along the Mid-Atlantic Ridge and to determine the temporal evolution of faults. They conclude that with continued extension, the strain becomes localized into increasingly narrower zones, and faults grow by propagation and linkage to other faults. The size of the fault zone is controlled by changes in the mechanical properties of the lithosphere as seafloor spreading continues. An automated method of classifying TOBI sidescan data is used by P. Blondel (Segmentation of the Mid-Atlantic Ridge south of the Azores, based on acoustic classification of TOBI data) to study segmentation of the Mid-Atlantic Ridge. When examined in detail, this area of the Mid-Atlantic Ridge consists of several short segments dominated by tectonism rather than volcanism. C.J. Robinson, R.S. White, M.J. Bickle & T.A. Minshull (Restricted melting under the very slow spreading Southeast Indian Ridge) present chemical evidence for limited melting under the very slow-spreading Southwest Indian Ridge compared to faster-spreading oceanic ridges. Samples of basaltic glass from two localities on the Indian Ridge are chemically distinct and are interpreted as reflecting variable degees of melting at different pressures. Conductive loss of heat is considered an important factor in very slow-spreading environments. A review paper by S.J.Edwards, T.J. Falloon, J. Malpas & R.B. Pedersen (A review of the petrology of harzburgites at Hess Deep and Garrett Deep: implications for mantle processes beneath segments of the East Pacific Rise) evaluates mantle processes as discerned from the petrology and geochemistry of peridotites, which represent the residues from which basaltic lavas were extracted. Two areas that expose harzburgites were sampled by dredging and ODP drilling, the Hess Deep on the Cocos – Nazca Ridge east of the East Pacific Rise, and the Garrett transform fault that offsets the East Pacific Rise. The former is considered to be near the center of a segment, whereas the latter is near the end of a segment. The petrology indicates that the harzburgites were generated by partial melting of adiabatically upwelling mantle and subsequent impregnation by reactive and crystallizing mid-ocean ridge basalt.

Three papers deal with modern hydrothermal processes at oceanic ridges, and a fourth paper focusses on Late Devonian hydrothermal sulfide deposits in the Ural Mountains. R.M. Haymon (The response of ridge-crest hydrothermal systems to segmented episodic magma supply) reviews the influence of magma supply at segmented rifts on the spatial and temporal distribution of hydrothermal systems. Because hydrothermal systems are driven by upwelling bodies of magma, the timing and depth of magma intrusion exert a fundamental control of the temperature and composition of hydrothermal fluids. At magma-rich segments, magmas intrude to shallow depths, water:rock ratios and fluid fluxes are high, and discharge occurs along dyke-induced fissures. Magma-starved segments are characterized by magma intrusion at greater depth, lower water:rock ratios and fluid flux, and fluid discharge along tectonically induced faults.

An example of fluid discharge along tectonically induced structures at major axial discontinuities where magmatism is intermittent is given by C.J. MacLeod & C.E. Manning (Influence of axial segmentation on hydrothermal circulation at fast-spreading ridges: insights from the Hess Deep). Gabbros in the Hess Deep sampled by the Ocean Drilling Program provide a record of early amphibolite-facies deformation related to cooling and fracturing, and later dense fracturing in the greenschist facies as gabbros were transported into the westward-propagating Cocos–Nazca plate. C.R. German, L.M. Parson, B.J. Murton & H.D. Needham (Hydrothermal activity and ridge segmentation on the Mid-Atlantic Ridge: a tale of two hot-spots) use sidescan and water column surveys to identify one hydrothermal site where the Reykjanes Ridge intersects the bathymetric platform surrounding Iceland, and several sites along the Mid-Atlantic Ridge between 36° and 38°N. The Reykjanes Ridge is dominated by volcanism, whereas the Mid-Atlantic Ridge is dominated by tectonism. Most of the hydrothermal systems between 36° and 38°N occur near ridge offsets, suggesting a close link between segmentation, magma upwelling and hydrothermal activity. The paper by V.V. Zaykov, V.V. Maslennikov, E.V. Zaykova & R.J. Harrington (Hydrothermal activity and segmentation in the Magnitogorsk – West Mugodjarian zone of the margins of the Urals palaeo-ocean) has defined seven distinct segments in a paleo-ocean basin that exert an important control on magma injection and heat flow, discharge of hydrothermal fluid, and the formation of giant massive sulfide deposits that are uncommon in modern ocean basins. Most hydrothermal deposits on the modern seafloor contain less than 100,000 tonnes of sulfides with the exception of the TAG (3.9 million tonnes) and Bent Hill – ODP (15–20 million tonnes) deposits.

The final section of the book deals with vent fauna and the implications of hydrothermal environments for the origin and evolution of organisms. E.C. Southward, V. Tunnicliffe, M.B. Black, D.R. Dixon & L.R.J. Dixon [(Ocean-ridge segmentation and vent tubeworms (Vestimentifera) in the NE Pacific] examine the biogeographic patterns of vent fauna in relation to plate history. They present evidence that small transform offsets do not impede gene flow along the ridge axis. However, the major offset between the Juan de Fuca and Gorda Ridges is associated with significant gene differentiation. E.G. Nisbet and C.M.R. Fowler (The hydrothermal imprint on life: did heatshock proteins, metalloproteins and photosynthesis begin around hydrothermal vents?) address the question of the origin and evolution of life on Earth. Using molecular evidence, they argue that the first organisms developed at hydrothermal vents and probably evolved from chemotrophic bacteria at vent sites.

The book is generally well produced, with few typographical or grammatical errors. Most of the figures are legible and carefully annotated. Running headings of each article are presented at the top of each page. Although the style of writing reflects that of individual authors, the material is generally up-to-date, logically organized and clearly presented. The book is appropriate as a related volume in the library of geologists, petrologists, geochemists and biologists studying the genetic links between ocean-ridge segmentation, magma injection, heat flow, hydrothermal fluid discharge, and the development and dispersal of vent fauna. The cost is comparable to other books in the field.

Wayne Goodfellow
Geological Survey of Canada
601 Booth Street
Ottawa, Ontario K1A 0E8

Manganese Mineralization: Geochemistry and Mineralogy of Terrestrial and Marine Deposits. Edited by Keith Nicholson, James R. Hein, Bernhard Buhn, and Somnath Dasgupta. Geological Society, Special Publication No. 119 (Geological Society Publishing House, Brassmill Lane, Bath BA1 3JN, U.K.), 1997, 370 p. US$115 (for members US$57) (ISBN 1-897799-74-8).

This volume wraps up IGCP Project 318, on Genesis and correlation of marine polymetallic oxides. It contains 22 papers, ranging in length from 4 to 57 pages. These papers are diverse, as befits an IGCP contribution, representing work on three continents and three oceans by authors from ten countries; the Western Hemisphere is somewhat under-represented. Mineralogy *per se* is an essential component of 15 of the articles. Assembling a cohesive volume with the great diversity of this one is difficult, and the result, though far from perfect, has achieved easy reading, though misprints and misspellings are a little distracting. Overall assembly, quality of binding, photo reproduction, and other mechanical matters are quite adequate.

The main audience for the volume consists of the practitioners of manganese and related deposits; a colleague points out that this volume is a poor place to start learning about the manganese field. For the Mn-Fe practitioner, however, articles such as those by Kulik and Korzhnev, Buhn and Stanistreet, Hein and others, Cronan, von Stackelberg, and Nicholson and Eley, at least, make access to this volume mandatory. I recommend that this volume be used in conjunction with *Economic Geology*, vol. 87, part 5, and *Ore Geology Reviews*, vol. 4.

Organization of the volume is ostensibly around a temporal comparison between Precambrian and Cenozoic manganese deposits, with a third section on laboratory aspects of geochemistry and mineralogy. I think that there are indeed two great strengths represented: description of manganese relative to iron deposition in the Precambrian, and manganese deposition into modern times in deep- to non-marine settings. The latter group of ten papers show a good appreciation of geological context and previous states of the depositional system. The five papers in the final section provide good support for the previous sections. However, a thorough exploration of the temporal theme would require papers on the "early Phanerozoic", *i.e.*, Cambrian through Miocene, covered in this volume only in an introductory review paper by Supriya Roy. Each of the two main sections contain papers that serve in part as reviews (by the indefatigable Geoff Glasby for Precambrian deposits and Jim Hein and others for modern Pacific deposition) and papers that present intriguing models (by Buhn and Stanistreet for neo-Proterozoic deposits and by David Cronan for manganese nodules). The following papers in each section are more locality-based. Four of these papers on marine nodules and crusts, for a total of 84 pages, may cause non-marine readers to drift into thoughts of potato harvests. Throughout the volume, thorough documentation *via* tabular material is a forte. Roy's review paper, together with his previous reviews in 1976, 1981 (a book), 1988, and 1992, provide a record of the tremendous progress of the field through twenty years of research. Though IGCP project 318 and its predecessor projects cannot be credited with all the advances, their impact was considerable and widespread. Currently, manganese-deposit researchers are in close contact with developments in chemical oceanography, paleo-oceanography, *etc.*, so the somnolence in the study of manganese deposition in, say, the 1970s will probably not be repeated.

Presentations in this volume provoke some questions for further research in my mind: 1) If Precambrian iron formations were such huge depocenters for manganese but are now mostly eroded, how important was such erosion in the supply of manganese to Phanerozoic marine sediments? 2) How important was thermal subsidence relative to eustatic change and high-stand depositional regression in producing observed stratigraphic relations in manganese deposits of all ages? 3) What part does manganese play relative to other syngenetic deposits in marine geochemical budgets, and relative to other hydrothermal deposits in the mass balance of hydrothermal systems?

Eric R. Force
Center for Mineral Resources
United States Geological Survey
University of Arizona
520 N. Park Avenue
Tucson, Arizona 85719, U.S.A.

ERRATA

In the article entitled "Benyacarite, a new titanium-bearing phosphate mineral species from Cerro Blanco, Argentina", by F. Demartin, H.D. Gay, C.M. Gramaccioli and T. Pilati (*Can. Mineral.* **35**, 707-712, 1997), please note that there should be no V in the formula reported on line 4, right-hand column, p. 711. Thus the affected segment of the formula should read $(Mn^{2+}_{0.75}Fe^{2+}_{0.21}Mg_{0.04})_2$.

In the article entitled "A note on the crystal structure of marshite" by M.A. Cooper and F.C. Hawthorne (*Can. Mineral.* **35**, 785-786, 1997), in the Abstract and in the Sommaire, the α cell edge should read 6.063(1) Å, *Z* should be 4, and CuI in the second sentence should be γ-CuI.