associated minerals versiliaite, $Fe_4^{2+}Fe_8^{3+}Sb_{12}^{3+}O_{32}S_2$, and apuanite, $Fe_4^{2+}Fe_{16}^{3+}Sb_{16}^{3+}O_{48}S_4$ (Am. Mineral., 64, 1230–1234(1979)).

X-ray study confirms derbylite is monoclinic, space group $P2_1$ or $P2_1/m$, a = 7.156(2), b = 14.354(4), c = 4.980(1)Å, β = 104.69(2)°, in good agreement with the previous data. The strongest lines (46 given) are 2.853(100)(131), 2.674(73)($\bar{2}31$), 3.186(43)(140,121), 3.118(33)(220), 2.479(23)($\bar{1}02$), 2.393(23)(060). Observed crystal forms are {100}, {110}, {120}, {$\bar{1}01$}, {010}, {$\bar{1}02$}, {$\bar{2}01$}, {$\bar{1}11$}, {$\bar{2}11$} and {$\bar{2}31$}. Twins on composition plane {153} were observed. In reflected light, derbylite is gray with bluish green reflections. Reflectivities measured at λ values of 470, 546, 586 and 650 nm give R_1 21.7, 19.9, 19.2 and 18.4, and R_2 19.7, 17.9, 17.0 and 16.6% respectively.

Derbylite is associated with versiliaite, apuanite, schafarzikite, bournonite, pyrite and sphalerite within dolomite in the Buca della Vena mine, Apuan Alps, Italy. **J.A.F.**

Vuonnemite, Epistolite

J. G. Rønsbo, E. S. Leonardsen, O. V. Petersen and O. Johnsen (1983) Second occurrence of vuonnemite: the Ilimaussaq alkaline intrusion, South West Greenland. Neues Jahrb. Mineral. Monat., 451–460.

Vuonnemite

Vuonnemite (Am. Mineral., 59, 875(1974)) forms bladed aggregates up to several centimeters long associated either with microcline and natrolite or with sodalite and villiaumite. Microprobe analyses (4 given) yield a formula based on 11 Na atoms: $Na_5TiNb_2(Si_2O_7)_2 \cdot 2Na_3PO_4 \cdot F \cdot 1.5\ O_2$.

X-ray study, oriented in a manner normal for members of lomonsovite–murmanite group, yielded a triclinic cell, a = 5.501(1), b = 7.162(1), c = 14.440(1)Å, α = 92.63(1), β = 95.33(1), γ = 90.57(1)° V = 565.81Å^3. H = 2–3, D (meas.) = 3.15, D (calc.) = 3.17 g/cm^3. Strongest lines (82 given) are 4.251(10)(11$\bar{1}$,$\bar{1}$11), 2.8728(10)(005), 2.7681(10)(1$\bar{2}$2), 2.7380(10)(200,$\bar{2}$01), 1.7874(126,230,040), 7.152(7)(002,010).

Vuonnemite is light yellow, sometimes with a brownish hue, vitreous luster. Whitish with a light green tint under SW UV light. Vuonnemite is biaxial positive, α = 1.6360(5), β = 1.6544(5), γ = 1.6795(5), $2V$ = 86(2)° (meas.), 82.3° (calc.). It has perfect {001} cleavage, with two other good cleavages. Orientation is $P \wedge \alpha = 57°$, $P \wedge \beta = 33°$, $P \wedge \gamma = 89°$, where P is normal to {001} cleavage plane, indicating the optic axial plane is far from parallel to {100}, as reported for the Kola material.

Epistolite

A recalculation of the Bøggild and Winther (1899) analysis of epistolite, containing 1.98% F, yields a structural formula of $Na_5TiNb_2(Si_2O_7)_2 \cdot F \cdot 1.5\ O_2 \cdot 5H_2O$, indicating that vuonnemite and epistolite, the Nb-rich minerals of the lomonsovite-murmanite group, have 1 Na atom more, 1 Ti+Nb atom less, and 1 F atom per formula unit as compared to the Ti-rich members. **J.A.F.**

BOOK REVIEWS

ATLAS OF ORE MINERALS. By P. Picot and Z. Johan. Co-published by Bureau de Recherches Géologiques et Minières, Orléans, and Elsevier Scientific Publishing Co., Amsterdam, 1982, 458 p. Translation by J. Guilloux, reviewed by D. H. Watkinson. $170.25.

This copiously illustrated monograph is a translation of the authors' *Atlas des Minéraux Métalliques* (1977), BRGM Mémoire 90, to which X-ray powder data, a strong-line index, cell dimensions, and descriptions of 17 minerals have been added. For three times the price of the original French edition, still in print in 1982, one gets these slender additions and, of course, the privilege of reading the work in English. The translation is mostly excellent. If you enjoyed the authors' elegant French, you can take pleasure in Mrs. Guilloux's graceful English. Only an occasional technical term (absorbent for absorbing, reflective for reflecting), an unintended "et" or "Mont," and the un-English hyphenation of ordinary words remind us that editors are not omniscient. The format is attractive, the print is easy to read, and the 21 × 21-cm pages yield a book that rests comfortably in the lap.

The book has a 59-page introductory section with chapters on "principles and interest of a metallographic study" (3 pages; Fr. "principe et intérêt," better understood as the *concern* of a mineragraphic study), the preparation of polished sections (3 pages), equipment for photography, photometry, and hardness testing (3 pages), "practical application of the method" (6 pages on qualitative and quantitative properties determinable in reflected light); "summary and advice for observation" (2 pages of hints on how to identify an ore mineral); a one-page note on the contents of the mineral descriptions that follow and on the photographic methods used; a list of minerals arranged by color, anisotropic effects, fabric, and some other properties (5 pages); a table of common mineral associations arranged by groups of chemical elements (5 pages; examples of simpler groups are Cu–As–Sn–Mo, Pb–Zn, W–Mn), a short table of white-light reflectance values, a table of maximum reflectance values arranged in the order 540, 420, 600, and 700 nm (5 pages), a table for the qualitative determination of some troublesome sulfides and sulfosalts (2 pages); and a collection of black-and-white photomicrographs illustrating fabric (54 excellent photos, the best in the book). A 40-page index of strong-line powder data, a short bibliography, an index of minerals (page numbers not given; used for cross reference), and a Contents follow the main part of the book.

The main part (352 pages) is a detailed description of 369 ore minerals. The arrangement of minerals preserves the French alphabetical order found in the 1977 edition but accommodates English alphabetical order by cut-in headings. Thus the description of gold (Fr. *or*), sandwiched between the descriptions of oosterboschite and oregonite, can be found from the cut-in entry "GOLD (p. 281)" in the alphabetical order goethite-gold-graphite. Each description includes ideal chemical formula, crystal system, cell dimensions, abbreviated X-ray powder data (from the original literature or from the authors' own work), color (supplemented by polishing characteristics and Mohs hardness), reflectance (qualitative note), anisotropism, texture, associated minerals, occurrences (brief listing, now including occurrences outside France), criteria for determination, and for most minerals a photomicrograph and a table of reflectance values at 20-nm intervals from 420 to 700 nm. On the whole, the descriptions are excellent—the best available for some minerals, and for others the only descriptions available in a comprehensive work.

If the descriptions are so good, surely it is ungenerous to say that they could have been made more useful by minor changes in reporting: R_O and $R_{E'}$ instead of R_{max} and R_{min} for optically uniaxial minerals, and Vickers hardness instead of Mohs hardness for all minerals. Though the first change might have required some slight additional observations, the authors had at their fingertips the means for making the observations while they measured R_{max} and R_{min}. For Mohs hardness, the style of reporting (for example, 2.5 to 3.5), the introductory discussion of the use of microhardness equipment, and a footnote giving the derivation of Mohs hardness from Vickers hardness suggest that Mohs hardness reported in the mineral descriptions is the derivative property and Vickers hardness the property actually measured. The suggestion that this may be so is reinforced by the fact that scarcely an ore mineral newly found in the last 20 years has been coarse enough to allow a direct determination of Mohs hardness.

Most of the photomicrographs that accompany the mineral descriptions are in color. The color photographs are intended to be a principal contribution of the monograph. They range from the beautiful (covellite seen with a single polar, p. 132) through the garish and thus for ore minerals unreal (too many examples!) to the ridiculous (bornite and digenite, p. 124). I choose not to see or remember my old friends the ore minerals looking like most of the minerals figured in color in this work. But tastes differ. Some of my associates who declare that they know nothing about ore minerals admire the color photos as art work. Other associates, familiar with color enhancement and the false-color techniques of rendering data obtained by remote sensing, are quite comfortable with the photographs that I find unreal. Many of these photos do show fabric very well, and perhaps that usefulness suffices. Nevertheless, I cannot help thinking that the color photos are meant to sell the book. Selling the book is a concern of publishers; selling the ore minerals short by distortion of their subtle colors is quite another matter, one that properly concerns anyone with a fair eye for color and a microscope that faithfully renders color in reflected light. Picot and Johan have both the eye and the microscope, as well as much skill in reporting what they see. I wish they had not had color film.

The high price of the book is enough to discourage buying it for one's own collection. The research mineralogist who has access to the 1977 edition will find few essential additions in the 1982 edition, but if his French is rusty he may find the English translation convenient. The teacher will need to decide how well the introductory section conveys the character or flavor of ore microscopy without, by the authors' intent, saying much about reflected-light optics and the powerful use one can make of optical theory and the measurement of reflectance. The student will need to understand that the special photographic conditions set by Picot and Johan must be duplicated if anyone else is to see ore minerals as they look in this book.

The authors introduce one piece of equipment by saying, "Honor to whom honor is due: The microscope." I say, honor Picot and Johan for their book. It is an original contribution (the authors quote Agricola's "I have omitted all those things which I have not myself seen . . ."), and a source of reflectance data of high quality. In spite of my carping, I think it is a great book, and I know it is a controversial one.

B. F. Leonard,
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GEOMETRICAL AND STRUCTURAL CRYSTALLOGRAPHY. By Joseph V. Smith. John Wiley and Sons, New York, 1982. 450 pages $29.95.

It is an honor to be invited to review a book by the Society's Roebling medalist, and it is a pleasure to be able to review a book that can be recommended without reservation to its intended audience.

This is very much a textbook, written with the particular needs of beginning students in mind. It begins simply, with a discussion of periodic packings in two dimensions that is used to introduce concepts such as those of unit cell, lattice and space group. Useful chapters on polyhedra and on geometry are then followed by ones on three dimensional packings and on point groups. These in turn are followed by a long and masterly chapter on band, rod, layer and 3D space groups. It is particularly pleasing to see the rod and layer groups clearly set out in an elementary text, although one might perhaps have wished for some examples of their application in crystallography (in the same way as the 3D space groups are illustrated using crystal structures).

The student who has worked systematically through the text to this point (and it should be emphasized that the book is designed to be read in just such a manner) will already have met a number of important crystal structures. The final two chapters (about a quarter of the book) are devoted to a more-or-less systematic description of a number of other structures. If these are mastered, the student should have a knowledge of most of the crystal structures that are considered of importance in mineralogy, although some (that of garnet is one) are left as exercises for the reader.

It is here that I feel I must quibble, not so much at the book under review, but at the blinkered nature of mineralogical teaching in general. The neglect of important structures that do not occur commonly in Nature seriously impedes the comprehension of mineral structures. How many mineralogists, one is tempted to ask, know the structures of Ni_2In, Ca_2Si, or Nb_3Sn? Yet they are of great importance, and it transpires, very relevant to the description of the structures of common rock-forming minerals.

But within its imposed constraints this is an excellent book. The author's intimate knowledge of, and enthusiasm for, the subject matter is very evident. It is very well written, illustrated, and indexed and almost free of misprints. There is a large number of problems and exercises that greatly enhance its value as a textbook for a course.

Michale O'Keeffe
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NOTICES

Program changes in the Division of Earth Sciences at NSF

In response to recommendations of the report, "Opportunities for Research in the Earth Sciences," from the NAS/NRC Board on Earth Sciences and the priorities listed in the Earth Science Briefing of the NAS/NRC Committee on Science, Engineering and Public Policy, there have been some significant changes in the structure of the Division of Earth Sciences (EAR) at NSF. These include the addition of two new programs, the "Instrumentation and Facilities Program" and the "Continental Lithosphere Program." The Instrumentation and Facilities Program is designed to respond to instrumentation needs in university earth science laboratories, especially when needed equipment is sufficiently costly that shared use is desirable. The Continental Lithosphere Program will deal with request for multidisciplinary, multi-institutional research projects of sufficiently broad scope and importance that there is broad support from a major sector of the earth science community.

In addition, three existing programs have changed their names. These include Seismology and Deep Earth Structure to Seismology, Environmental Geology to Surficial Processes and Mantle Geochemistry to Volcanology and Mantle Geochemistry. Except for Volcanology and Mantle Geochemistry which has been expanded to include all aspects of volcanological research there is no change of scope for the programs.

Annual target dates for submission of proposals will continue to be announced in the NSF Bulletin. Although compliance with the target dates may reduce the time needed by NSF to reach a funding decision, proposals will be accepted at any time during the year. Instructions for preparation of proposals are included in "Grants for Scientific and Engineering Research (NSF 83-57). Project descriptions should not exceed 15 single-spaced pages (or the equivalent of 30 doubled-spaced pages is acceptable) or they will be returned to the principal investigator.

New Facsimile Edition of Russian/English Dicitionary

Originally published in the USSR, this dictionary has been nearly impossible to find in the U.S. for 20 years. Officially titled *Russian-English Geological Dictionary*, the 560-page volume was compiled by T.A. Sofiano; edited by A.P. Lebedev, and V.E. Khain; and published in Moscow in 1960. The new AGI edition is a hardbound, page-for-page facsimile of the original. It contains approximately 85,000 terms relating to general geology, geochemistry, engineering geology, mineralogy, stratigraphy, and petrography. Also included are English equivalents of Russian letters used in the transliteration of proper geographical names, plus a list of foreign geologists who, in the Soviet view, were prominent in the late 1950's. Priced at $18.95, the *Russian-English Geological Dictionary* is available from: American Geological Institute, Customer Service Department, 4220 King Street, Alexandria, VA 22302