Crystal structure study found machatschkiite to be hexagonal, space group $R3c$, with a = 15.127(2) and c = 22.471(3)Å, after refinement to R = 0.040. The new chemical formula is $Ca_{6-x}Na_x(AsO_4)(AsO_3OH)_3(PO_4)_{1-x}(SO_4)_x \cdot 15H_2O$ ($x \sim 0.3$), with Z = 6.

Discussion

An abstract concerning this mineral recently appeared in Am. Mineral., 67, 418. **P.J.D.**

Makatite

H. Annehed, L. Fälth and F. J. Lincoln (1982) Crystal structure of synthetic makatite $Na_2Si_4O_8(OH)_2 \cdot 4H_2O$. Zeitschrift für Kristallographie, 159, 203–210.

Crystal structure analysis of synthetic crystals yielded a monoclicic unit cell with a = 7.3881(5), b = 18.094(3), c = 9.5234(5)Å, β = 90.64(1)°, space group $P2_1/c$. The given formula is $Na_2Si_4O_8(OH)_2 \cdot 4H_2O$ with Z = 2. The structure was refined to R = 0.051 for 834 independent reflections, **P.J.D.**

Melanothallite, Unnamed $CuCl_2$

L. P. Bergasova and S. K. Filatov (1982) The chemical formula and crystallochemical characteristics of melanothallite, Cu_2OCl_2. Zapiski Vses. Mineralog. Obsh., 111, 562–565.

Melanothallite was described in 1870 by Scacchi as a black, platy mineral found among sublimates of Vesuvius, associated with eriochalcite, chalcokyanite, euchlorine, and dolerophanite. It was unstable, altering to green minerals. Its composition was variously given as CuCl(OH) and $CuCl_2$. The mineral had been classed as doubtful in all standard references.

The present paper describes material, corresponding closely to the Vesuvius material, found as the result of the fissure eruption of Tolbachin Volcano, Kamchatka, in 1975–1976. It is black to bluish-black, luster vitreous, deep brown in fine fragments. Plates up to 1 × 0.5 × 1 cm were found. Brittle, with a perfect cleavage probably prismatic. The mineral is partly dissolved by water, completely in warm dilute acids. It alters rapidly in a few days to green material. When heated in air, decomposes to tenorite at about 400°C.

Analysis by T. A. Cherepova gave Cu 59.41, Cl 28.33, O calc. 8.55, Pb 0.01, Zn 0.07, Na 0.04, K 0.06, Li 0.04, SO_4 1.20, H_2O^- 1.75, H_2O^+ 0.05, total 99.51%. O was calculated to correspond to Cu_2OCl_2. The analysis gave 8.63% excess Cu, probably present as tenorite.

X-ray powder data showed complete correspondence with data for synthetic Cu_2OCl_2. The strongest lines (38 given) are 5.041(100)(111), 2.947(44)(202), 2.518(77)(222). They are indexed on an orthorhombic cell, space group $Fddd$, a = 9.595, b = 9.693 c = 7.461Å, Z= 8, D calc. 4.08.

Associated minerals include euchlorine, chalcokyanite, dolerophanite, tenorite, and "a felt-like mineral, $CuCl_2$, of gold-brown color".

Discussion

The close resemblance of the material to that described as melanothallite justifies re-instatement of that mineral as a valid species. It would be reassuring to have type Vesuvius material checked, if any unaltered material can be found. **M.F.**

Roeblingite

P. J. Dunn, J. A. Norberg, and P. B. Leavens (1982) Roeblingite: new chemical data. Mineral. Mag., 46, 341–342.

New chemical analyses of roeblingite from Franklin, New Jersey, and Långban, Sweden, suggest that Mn is essential to roeblingite. The average of 4 microprobe analyses of Franklin material yield: SiO_2 24.9, CaO 23.8, SrO 2.4, MnO 2.4, PbO 30.2, SO_3 10.4, H_2O (by Penfield method) 6.13, sum = 100.23%. The suggested new formula is $(Mn,Ca)_2(Ca,Sr)_{12}Pb_4(SO_4)_4Si_{12}O_{28}(OH)_{20}$, assuming ordering on a site of rank 2. **P.J.D.**

Roggianite

E. Galli (1980) The crystal structure of roggianite, a zeolite-like silicate. Proc. 5th Int. Conf. on Zeolites, 205–213.

Crystal structure analysis found roggianite to be tetragonal, space group $I4/mcm$, with a = 18.332(10) and c = 9.164(5)Å, Z = 1, with refinement to R = 0.102 the structure study revised the chemical formula to: $Ca_{16}[Al_{16}Si_{32}O_{88}(OH)_{16}](OH)_{16} \cdot \sim 26H_2O$. **P.J.D.**

Walpurgite

K. Mereiter (1982) The crystal structure of walpurgite, $(UO_2)Bi_4O_4(AsO_4)_2 \cdot 2H_2O$. Tschermaks Min. Petr. Mitt., 30, 129–139.

Crystal structure analysis with refinement to R = 0.041 finds the formula of walpurgite to be $(UO_2)Bi_4O_4(AsO_4)_2 \cdot 2H_2O$, which is one more H_2O than was previously known. **P.J.D.**

BOOK REVIEWS

CLASSIC MINERAL LOCALITIES OF THE WORLD: ASIA AND AUSTRALIA by Philip Scalisi and David Cook. Van Nostrand Reinhold, Co., Inc., New York, 1983. vii + 226 pages. $29.95.

To many people a gemstone or a spectacular mineral specimen is a "thing of beauty and a joy forever," irrespective of their professional persuasion. P. Scalisi and D. Cook in compiling "The Classical Mineral Localities of the World" into a series of volumes by geographic area are addressing the needs of collectors, historians and mineralogists.

This first volume on Asia and Australia documents the sites and sources of some of the marvelous, and often well-known and prized, mineral materials usually observed as part of museums or private collections. Since many of the deposits that provided the specimens are exhausted, the book should appeal to both scientists and historians. Ancient photographs (many from 1910) of mining areas in Japan, China, Burma, Sri Lanka, India, Afghani-

stan, Iran, Russia and Australia sprinkle the 200 pages. The brief text often cites local lore and is accompanied by sketch maps for the localities, a few references, also usually ancient, and crystal drawings, most of which are extracted from Goldschmidt's *Atlas der Kirstallformen*, for each mineral species discussed. Forty-eight color plates of the exciting specimens of natural minerals and faceted gemstones, collected in one signature, unfortunately, illustrate the range of color, shapes and sizes.

Not an exhaustive, authoritative text, this volume is an historic documentary of selected specimens in some of the world's best collections (Harvard, Smithsonian) related to their localities. The book will be purchased by those who love the symmetrical beauty of these inorganic natural works of art. It should perhaps find its way to the shelves of geology libraries where it will become a reference compendium for those of us in need of samples for display and delight as well as researchers requiring standards for comparsion. The idea of documenting localities in-house and afield may well give rise to numerous clones (or tomes!).

H. CATHERINE W. SKINNER
Yale University

PETROGRAPHY, An introduction to the study of rocks in thin sections, second edition. By Howel Williams, Francis J. Turner and Charles M. Gilbert. W. H. Freeman and Co., San Francisco, Cal., 1982. 626 pages, 162 illustrations, hardbound $29.95.

The first edition of this well-known textbook, by the same authors, was published in 1954. It is of interest to quote the last two lines of E. Wm. Heinrich's book review of that edition (*The American Mineralogist*, 1955, 40, 132–134): "There is no doubt that this book is well conceived, well organized and well executed, particularly for a first edition, and that it will have widespread success commensurate with its high quality." Heinrich's evaluation and prediction were totally correct. Indeed the first edition of this book became a standard text in petrology and petrography courses.

The second edition, at a first glance, looks like the first one because all the petrographic microdrawings (executed by the late co-author Howel Williams), except for one, have been retained in the present edition. Upon closer inspection, however, it becomes clear that the sequence of subject treatment, the grouping of rock types, and the discussion of rock classifications has changed greatly. Indeed a considerable part of the increase in size of the book (the first edition had 406 pages and the second contains 626 pages) is the result of the expanded treatment of petrogenesis and schemes of rock classification.

The book consists of three distinct parts. Part one, igneous rocks (274 p.); part two, sedimentary rocks (152 p.); and part three, metamorphic rocks (140 p.). It also contains two short appendices. The first (10 p. long) is entitled "Elementary treatment of mutual relationships between some critical thermodynamic functions." This appendix was written "as an aid to thinking in thermodynamic terms" and "is written in the simplest possible terms and illustrated with plots of specific data for albite and water" (quoted from the authors' preface). The second appendix consists solely of drawings for aid in the visual estimation of the percentage composition of rocks in thin section.

Let me quote from the first few lines of the Preface: "Our aims in this book are much the same as they were in the first edition: we are concerned primarily with the description of common rocks as they appear in thin section beneath the petrographic microscope. We have assumed that our readers have already learned how to identify rocks within broad limits by use of a hand lens; indeed it is most desirable that observers have available the handspecimens from which the thin sections were cut. Readers must already be acquainted with the principles of optical mineralogy, for this is the very basis of petrographic technique." Indeed, the clear and well-written petrographic descriptions of rock types and associations, and their accompanying petrographic microdrawings are the most important aspects of this book in the study of petrography. As part of a petrology and/or petrography course the student will be studying representative thin sections under the microscope, in the laboratory part of such a course. With the thin section still under the microscope the student can directly relate his own observations to those described in *Petrography* for a range of world-wide, well-known and classical occurrences.

An especially attractive aspect of the book is the authors' success in keeping the number of terms, especially in igneous petrology, to a reasonable minimum. As they state "no new rock names have been coined, though a few, pertaining to rocks that have recently assumed new significance in geology, have been added to the list appearing in the first edition" (from the preface). Indeed, alternate terms which the authors consider superfluous have been relegated to specially marked footnotes.

Many parts of the second edition have been given a completely new treatment from what appeared in the first edition. Chapters 1 and 2 entitled "Magma and igneous crystallization" and "Characteristics and classification of igneous rocks", respectively now constitute 93 pages (as compared with 36 in the first edition). In the latter part of the second chapter the authors point out that because the aim of the book is to describe rocks in the simplest terms, rather than to discuss classifications of rocks, no attempt will be made to set out and appraise individual systems. However, on subsequent pages, the authors discuss with great clarity and personal conviction their reasons for not wishing to adopt rigorously a classification such as developed by A. L. Streckeisen for igneous rocks. Instead they lean heavily toward a more flexible and genetically significant scheme put forward by Rosenbusch about a century ago. The approach used in the book is, however, generally consistent with the IUGS classification (after A. L. Streckeisen).

The systematic treatment of igneous rocks is as follows: Chapter 3—nonfeldspathoidal rocks; Chapter 4—silica saturated intermediate rocks; Chapter 5—acid rocks; Chapter 6—feldspathoidal mafic rocks: basic and ultrabasic; Chapter 7—feldspathoidal felsic rocks: intermediate with basic variants; Chapter 8—lamprophyres and ultrabasic rocks of extreme composition; and Chapter 9—pyroclastic rocks. The end of Chapter 8 contains a well-written and interesting synopsis entitled "Suplementary notes on the petrography of upper-mantle rocks."

The sedimentary rocks are treated in six chapters of which Chapter 10 ("The origin of sedimentary rocks") and Chapter 11 ("Composition and texture of sedimentary rocks") are introductory to the systematic treatment of sedimentary rock types. Rocks are covered in Chapter 12—mudstones and shales; 13—sandstones; 14—limestone and dolomites; and 15—miscellaneous sedimentary rocks. As in the case of igneous rocks, the nomenclature and classification is similarly devoid of overly specialized (and/or superfluous) terms. It is my understanding,

however, that the classification scheme for sedimentary rocks does not incorporate some of the developments in sandstone petrology during the last decade. For example, some sedimentologists would like the term "greywacke" discussed only in terms of its historic significance, whereas in this book it still retains the status of a well-defined rock type.

The metamorphic rocks are covered in five chapters of which the first chapter (Chapter 16) entitled "Metamorphism and its lithologic expression" deals with the general textural and structural features of metamorphic rocks and their classification. This chapter has considerable discussion of the concept of metamorphic facies, but hardly mentions metamorphic zoning as defined by isograds as in the well-studied pelitic assemblages. The remaining chapters cover the following: Chapter 17—products of contact metamorphism; Chapter 18—metamorphic products of mechanically dominated strain; Chapters 19 and 20—products of regional metamorphism, with Chapter 19 covering rocks of low metamorphic grade and Chapter 20, rocks of higher grades.

At the end of each chapter there is a small selection of references to books and journal articles that are easily accessible and represent classic, comprehensive works.

This is a very well written book. I stress the quality of writing because the combination of scientific significance and English fluency is very difficult to achieve in petrographic description. It will have its greatest use in the practical study of thin sections, in the laboratory part of an upper-level Petrology course. In such a course it would undoubtedly be a companion volume to a petrology text. In a course on petrography alone, it could serve as the single text. For those who will continue their professional work in a petrology-related subject, it will always retain its usefulness as a reference.

CORNELIS KLEIN
Indiana University

VNR COLOR DICTIONARY OF MINERALS AND GEMSTONES by Michael O'Donoghue. Van Nostrand Reinhold Co., New York, London, printed in Czechoslovakia. 1976 in England, October 1982 in U.S. 159 pages, approx. 350 photos in color. Identification tables, bibliography, important addresses, conversion tables, table of contents, and index. $12.95.

Over 1,000 mineral species and their varieties are described briefly in this soft cover volume. Each description is accompanied by the chemical formula for the substance, a descriptive paragraph of the species, information on the mode of occurrence in the earth, common localities, treatment or how to care for specimens of the species, and, where it applies, some description of the fashioning of the mineral for lapidary or gem purposes. Descriptions are concise, brief, and useful, as you would expect in a dictionary. The volume is designed for both amateur and professional and it proves useful to both.

The color plates vary in size from full page to four or five on a page with text. Surprisingly, the color reproduction is quite accurate considering the modest retail cost of the volume. Some slight washing out of colors and lack of intensity do not detract from the overall accuracy and usefulness of the photographs.

The volume is arranged according to Max Hey's *Chemical Index of Minerals*, useful if you have had experience with the system. However, for the collector not used to the Hey system the Dictionary might better be arranged alphabetically. What is gained in developing an understanding of the chemical relationships inherent in using the Hey system is, I think, outweighed by the ease of use alphabetization would allow.

The specimen subjects used in the photography seem particularly well chosen because they tend to reflect the norm for many species rather than the best of a species. Such selection gives the reader a more realistic view of the minerals apt to be encountered. The photographs, in addition, aid in crystal study and visualizing of properties so they are particulary effective for the amateur and student.

There are, as in every text, some omissions or errors. These are minor. As an example, under the discussion for wulfenite, no Arizona localities are mentioned, though they rank among the world's best, while South Dakota is noted as a source. The author lists Panasquiera as a source of wolframite though recent work suggests what has been considered as such is now known to be ferberite. Again, such items are minor when considering the overall usefulness of the text.

Upon review this text would lend itself particularly well to the uses intended, for the amateur collector and the professional. It seems particularly well suited as a supplemental reference for students of mineralogy. It is priced such that any student should be able to use it as a second text in a high school or college level course. I would certainly recommend it to my students.

ROBERT W. JONES
Scottsdale, Arizona

DIAMONDS From Birth to Eternity. By A. N. Wilson. Gemological Institute of America, 1982. xv + 450 pages.

Diamond, as a topic, seems to act as a magnet for people who desire to write books. In the last 5 years alone there have been published at least 7 different books of varying quality on diamond. These include coffee-table editions, books for gemologists and jewelers, and popular-type texts about the romance of diamond and the diamond trade. One recent writer even attempted by misrepresentation and innuendo to bring about the collapse of the diamond market. Why then with such an abundance of literature, should Wilson add further material to the storehouse of diamond?

The answer to this question lies in the fact that it is primarily a treatise on the geological occurrence, including genesis of diamond and kimberlite. Although Bardet in his three volume work has previously done a somewhat similar thing he (Bardet) wrote almost entirely for scientists and people exploring for kimberlite and diamonds. In contrast, Wilson, who is not a scientist, has written an account for the interested layman, the geologist, and the gemologist of the recent theories of geology and their influence on ideas regarding the occurrence and formation of kimberlites and diamond. Such a thing has not been attempted since the publication in 1932 of Williams' classic work entitled "The Genesis of Diamond".

After working one's way through 25 pages consisting of a picture of an elephant's head, a title, a second title, a Foreward, the Contents, a list of illustrations, a Preface, an Acknowledge-

ments and Bibliography, and finally a second acknowledgement of almost everybody including the coffee-person by the editorial assistants, one arrives at the text.

In Part I, entitled Probing the Earth's Mantle, Wilson describes many geological phenomena and recent theories regarding their origin. Continental drift, plate tectonics, fracture zones and hot spots are all included. A wealth of information is provided in order that the non-geologist can understand how these theories and ideas pertain to the origin of kimberlites and diamonds.

Wilson, not being a geologist, must be forgiven for his lack of criticism about the various theories. Several errors occur in the text and these will result in the non-specialist reader drawing incorrect conclusions and inferences. For example, Wilson infers that the Hannay diamonds are in fact compounds of silica, a suggestion that is definitely not true. Material labelled "Hannay Diamonds" in the British Museum are diamonds; whether or not Hannay made them is another matter.

The major portion of the book (Part II is a review of the occurrence of diamond and/or kimberlites by country. This is a very useful compendium but the reader again has to be very careful as several errors have crept in. For example. in the section on the United States the kimberlites of Kansas are incorrectly placed in the Silver City-Rose Dome area and not in Riley County where they properly should be. In Guinea there is no mention of the major cluster of kimberlites at Bounoudou on the Baoule River, and instead the minor group west of Beyla are described. The diamonds from the Roraima series in Venezuela and Guyana are ascribed to being derived from kimberlites that intruded the Roraima. This is not true, as the diamonds are part of the heavy mineral suite of the Roraima rocks. Also in Guaniamo in Venezuela there is no evidence that kimberlites of Cretaceous age occur. This is completely unfounded speculation.

The final three parts of the book are the "raison d'etre". Here Wilson discusses the origin of kimberlites and diamonds. This is an excellent account for the layman concerning recent developments in science. Unfortunately, but allowable since it is the author's prerogative, he has obviously wholeheartedly embraced the "fracture zone school" and thus finds almost all kimberlites to be the result of this type of tectonics. Similarly, very early on in the text Wilson decided that kimberlite is the mother of diamond and sadly has not kept an open-mind as regards other possibilities suggested by the same evidence he quotes.

One obvious deficiency in the book is the fact that it does not appear to have been reviewed by geoscientists prior to publication. Such a review would have probably removed various errors and helped considerably in improving the text in several places. Nevertheless, this criticism has to be considered against the fact that the author was not writing a scientific text, and the impetus for the book was his own love and fascination of diamond, and the unravelling by science of the secrets of diamond.

For the scientist and layman interested in an account of the development of scientific ideas about diamond, albeit biased at times, this book is worth reading. It is also worth reading for the wealth of information it provides, and the fact it will most likely become a collectors item, especially the leather bound limited edition.

HENRY O. A. MEYER
Purdue University

PROCEEDINGS OF THE FIRST INTERNATIONAL GEMOLOGICAL SYMPOSIUM 1982. Edited by Dianne M. Eash. Gemological Institute of America, 1982. vii + 568 pages.

In February 1982 the Gemological Institute of America celebrated its 50th anniversary. To commemorate the occasion the G.I.A. held a symposium at which leading gemologists, scientists and persons associated with the gem trade presented review talks. Many of these talks are assembled in the Proceedings volume published by the G.I.A. For anyone interested in gemology or gem minerals in general this compendium of papers is well worth reading.

The range of subject matter is large, from diamond, through colored stones to pearls as well as articles on the commercial aspects of the gem trade. The organization of the various topics in the volume follows the time framework of the symposium in which multiple sessions occurred. This unfortunately leads to a jumbling of topics and thus papers, for example on diamond and on colored stones, become somewhat scattered through the text. In fairness though it should be noted that the scattering is in groups, each group of papers belonging to the same topic, *e.g.*, origin and sources or properties.

Another unfortunate aspect, but perhaps a minor one, is that it has religiously included all speakers and their topics in the Contents even though several have no papers in the volume. A note alongside these speakers names of this fact would have been useful. However, in the Index of Authors, and Papers in the back of the book only those authors whose papers and abstracts are published have been included.

In view of the wide scope of the volume it is impossible to do justice to many of the excellent papers. In order to illustrate this scope a few articles will be mentioned but these should not be construed as necessarily being the best, or the worst.

One theme of the symposium was diamond and under this heading one can find papers on origin, synthesis of gem quality, fancy colored, graining, laser sawing, mineral inclusions and marketing. Under Colored Stones one can read papers on description, irradiation, heat and diffusion treatment, color enhancement, and sources. Pearls are covered by articles on such topics as natural pearls, and American freshwater pearls. Two excellent articles on emeralds, including Brazilian occurrences are included, as well as one on fluid inclusions in gemstones. Four articles are present on gemology and the market, and a number of papers address aspects of general gemological interest. Also one can read about the workings of the "syndicate"; a much maligned organization.

The volume is well illustrated with colored plates, and typographical errors in English are a minimum. All published papers have abstracts in English, French, German and Japanese, a reflection of the international scope of gemology and the symposium.

An interesting facet of some of the articles is that they are verbatim reports and thus one is even supplied with jokes a somewhat refreshing change from the usual dry scientific prose. As one author writes "Pearls are like girls, once you discover them, you never stop loving them."

Through this book I think some could come to love gems; and for those who already do, I believe the book will be a welcome companion.

HENRY O. A. MEYER
Purdue University