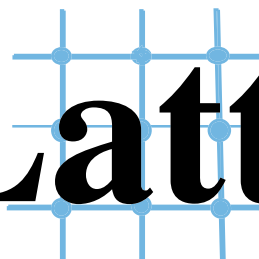


The Lattice



The Newsletter of the
Mineralogical Society
of America

Subscription and membership
information
is on page three.

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Institutional subscribers are entitled to electronic access to *American Mineralogist*; contact business@minsocam.org to give us your IP address.

Resources for teaching petrology in the 21st century

The NAGT On the Cutting Edge program sponsored the Teaching Petrology in the 21st Century workshop last summer. The goals of this workshop were to explore new methods of teaching igneous and metamorphic petrology in the context of modern advances in understanding the Earth system, analytical and field methods, and information technologies. The workshop included a pre-meeting fieldtrip, demonstrations of laboratories and computer-assisted learning activities, and general sessions addressing current issues in teaching petrology. An outgrowth of this workshop is an extensive array of web-mediated instructional resources and services (<http://serc.carleton.edu/NAGTWorkshops/petrology/index.html>). On this website you will find:

- The workshop program with activities, discussion summaries and related documents
- Supporting instructional resources; a digital library of internet resources intended to help faculty in teaching or designing petrology courses. Many of the resources are lecture notes or PowerPoint presentations that are illustrated with useful diagrams, graphs and figures. There are also course syllabi, petrology

projects, and on-line galleries of photomicrographs.

- A collection of educational resources used in igneous and metamorphic petrology courses. The collection includes lab exercises, classroom activities, problem sets and more. The purpose of this collection is to allow for the sharing of materials within the community of petrology teachers.

- A registry of analytical equipment. This service is provided to help: lab managers build their user base; researchers, instructors and students to gain access to analytical equipment to support scholarly work; and build capacity by optimizing the use of existing analytical equipment to support

excellence in science and the training of geoscientists.

We invite the MSA community to regularly use these collections and services. In addition, we need your help to continue to grow these collections. We have systems in place on the website to make it easy for you to submit suggestions of additional web-based resources, to post your best teaching activities, and to register your analytical equipment. Please send any additional queries or comments to: Dave Mogk, mogk@montana.edu.

This project was funded by the National Science Foundation, Division of Undergraduate Education.

MSA's 85th Anniversary

2004 is an anniversary year for MSA. MSA was founded on December 30, 1919, and was up and running with a publication at the start of 1920. The timing may seem remarkable, but MSA did not spring up from nothing. As early as 1916 Edward H. Kraus was organizing an effort for a new society. Although delayed by the war, he corresponded with potential members and sought their advice and support. The result was the invitational letter on December 30 to interested individuals for an organizational meeting. There were 28 people who attended. At that meeting the final offer to transfer ownership of the *American Mineralogist*, which had been founded in 1916, was made and accepted.

Letter from the President

Generosity of members helps to sustain student grants and outreach programs of MSA

by Michael Carpenter

One of the pleasant duties that fall to the President of MSA is to correspond with members from all over the world. Diverse and interesting email messages and letters are always arriving. For example, some kind members were quick to point out that I had mistaken V.M. Goldschmidt (crystallographer) for V.M. Goldschmidt (geochemist) in my last column in *The Lattice*. Another senior member sent me some personal reminiscences about E.H. Kraus (founder of MSA) whom he had known at the University of Michigan. It is also reassuring that members of our

community take the trouble to send in complaints about aspects of the activities of the society that they are not happy with, as this gives us a chance to put things right. Without a doubt, however, the pleasantest task involves writing to individual members to thank them for their generosity in making donations to MSA over and above their dues. Many members have given generously year after year but, when Bill Carlson was President, he introduced a voluntary contribution scheme in which members were invited to donate \$1 for every year since they had joined. This

scheme seems to appeal even to our newest members and, this year, about 25% of members have given the society a total of nearly \$25,000. A full list of members who have made donations to MSA is given elsewhere in this issue of *The Lattice*. I thought that their generosity should be acknowledged by explaining in my column how the society uses the money.

Member dues are calculated to just cover the costs accompanying individual memberships, such as the newsletter, ballots, and mailing. Short courses, RiMG volumes, and individual subscriptions to the

American Mineralogist are also calculated to just cover the actual costs involved. It is the additional funds from member donations that have sustained the other activities that the society undertakes to support its members and promote our science. Alex Speer put together the following data to show how these additional funds have grown. Note that the steady income from donations has minimized the impact of stock market declines, which have affected MSA's other long-term investments.

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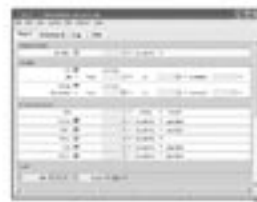
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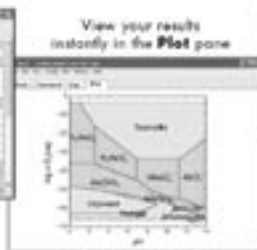
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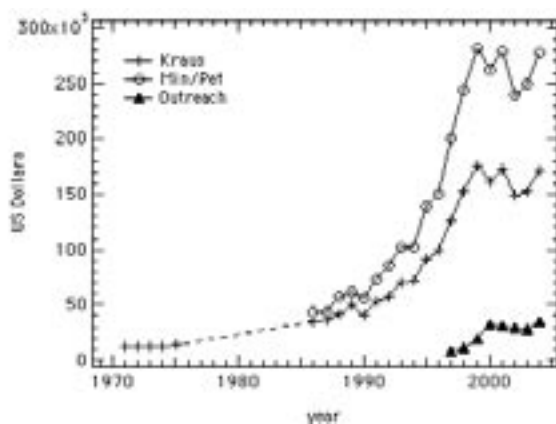
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ship activities was established in the early 1970s through a donation of shares worth about \$10,000 by E.H. Kraus. He specified that this fund, the Edward H. Kraus Crystallographic Research Fund, should be used to provide small research grants to support the work of young researchers in the field of crystallography. At first the grants were for \$1500 and could only be offered every few years. The grant is now worth \$5000 and is awarded annually. What we understand by the term “crystallography” has changed greatly in the intervening years and the Kraus Crystallography Grant committee encourages applications in crystallography in the broadest sense of the subject. A list of recipients of grants from this fund and the titles of their projects is given on the society’s website (www.minsocam.org/MSA/Awards/Crystallography_Award.html).

The first MSA Grant for Student Research in Mineralogy and Petrology was given in 1981 (to Bill Carlson for an “Experimental Investigation of subsolidus equilibria in feldspathic peridotite and gabbro”!). Funds to sustain this grant have accumulated through member generosity and the list of awards on the website (www.minsocam.org/MSA/Awards/Min_Pet_Award.html) again makes interesting reading. MSA is now able to fund two grants of \$5,000 each year. Any student is eligible to apply. There are few, if any, national research funding agencies that offer equivalent types of grants to researchers at this very earliest stage of their careers. Anyone who has ever served on the Min/Pet grant committee will certainly have been impressed by the high quality of the proposals which come in and with the self-evidently bright futures of the students who submit them.

The MSA Distinguished Lecturer Program was established in 1989. The Outreach Fund will eventually support it. The original concept was that MSA should arrange visits of an established scientist in the field of mineralogy, petrology, or geochemistry to small colleges or universities in North America, which would not usually have an opportunity to welcome an eminent scientist. The first lecturers were Edwin Roedder and Mary Ellen Cameron and the list of lecturers (http://www.minsocam.org/MSA/Lecture_Prog.html) reads like a Who’s Who of our distinguished colleagues. This has been a very popular program and, for MSA Councilors preparing to attend council meetings, the reports of the lecturers (often including anecdotes of complicated travel arrange-

Continued on page 9



The Lattice is published quarterly (February, May, August, November) by the Mineralogical Society of America. It is distributed to MSA members and subscribers as a service. Articles and letters are welcome.

The Mineralogical Society of America is composed of individuals interested in mineralogy, crystallography, and petrology. Founded in 1919, the Society promotes, through education and research, the understanding and application of mineralogy by industry, universities, government and the public.

Membership benefits include: *American Mineralogist*, published bi-monthly; 25% discount on volumes in the *Reviews in Mineralogy and Geochemistry* series; *The Lattice*; special subscription rates for *Mineralogical Abstracts*, *Physics and Chemistry of Minerals*, *Journal of Petrology*, *Rocks and Minerals*, and *Mineralogical Record*; reduced registration fees at MSA short courses; member rates for the MSA/Geological Society of America annual meeting and member rates at MSA’s spring meeting with the American Geophysical Union; participation in a Society that supports the many facets of mineralogy.

Dues for 2004: professional members \$55; student members \$5. *American Mineralogist* subscription: members add \$40 (paper and electronic); \$10 electronic. Membership is on a calendar year basis. Individuals who join after January 1, 2004 will be sent all back issues of volume 89 for 2004.

Additional membership information and an application, and/or a price list of the Society’s publications are elsewhere in this newsletter, or contact the Business Office.

Institutions may subscribe to the 2004 volume of *American Mineralogist* for the annual rate of \$625 in the US and \$650 for non-US addresses. The subscription price includes any new volumes of the *Reviews in Mineralogy and Geochemistry* series and issues of the *Lattice* published during the calendar year of the subscription. Payment must be received in full before a subscription will be started.

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Notes from Washington

by J. Alexander Speer,
MSA Executive Director

- Ballots for the 2004 election of 2005 MSA officers and councilors were mailed to members at the beginning of April 2004. They are due back in the Business Office by August 1, 2004. The individuals you elect to office decide on the direction of the Society. Voting is an important job for all MSA members. If you have not yet received a ballot please contact the MSA Business Office.

- During its 2004 Spring Meeting, MSA Council voted to keep the 2005 professional member dues at \$55. Student dues remain at \$5 to encourage members to sign up student members. Member subscriptions to the paper copy of *American Mineralogist*, which includes online access, remains at \$40. The cost of access to the online electronic version increases to \$15. Institutional subscriptions to the paper journal were increased to \$650 for subscribers with U.S. addresses and \$675 for subscribers with non-U.S. addresses. Included with the institutional subscription is *Reviews in Mineralogy and Geochemistry*, as well as access to the electronic journal.

- The institutional or library *American Mineralogist* subscription includes access to the online version. As of spring 2004 about two-third of institutional subscribers have gained access to the journal online. If your institution subscribes to the journal, and does not yet have electronic access, it is simple to make the request. A library needs to tell us who they are and their IP or range of IP addresses. The information should be sent to business@minsocam.org.

- There are two new MSA-GS publications since the February *Lattice*. *Reviews in Mineralogy and Geochemistry*; Volume 55: *Geochemistry of Non-Traditional Stable Isotopes*, 2004, Clark M. Johnson, Brian L. Beard, and Francis Albarede, editors and Volume 56: *Epidotes*, 2004, Axel Liebscher and Gerhard Franz, editors, have been released. These are described more fully on the MSA website along with their table of contents. You can order your copy using the order form elsewhere in this issue, online, or by mail, e-mail, phone, or fax.

- MSA 2005 membership renewals will start in September with mailing of hardcopy renewals to all members, followed by an electronic notice for online membership renewal soon afterwards. This is what we did last year. We have found that the number of members willing to renew online remains at about one-third, and the processing of these online renewals before preparing and sending the hard copy notices makes for tight timing. Complicating matters is that this all occurs at the same time the office is preparing for the Fall meeting. The timing may also contribute to the large number of renewals received in a very short time span around December 31 that

the office has difficulty processing in a timely manner. If you have never shared your current e-mail address with MSA and would like to participate in the online renewal, please send us your address. As always, you can save your Society money by renewing early whether you chose to use the electronic or the traditional paper versions. As encouragement there will again be a \$5 discount on the professional membership dues for renewals received before December 31, 2004.

If you subscribe to other journals through MSA - *Journal of Petrology*, *Physics and Chemistry of Minerals*, *Mineralogical Abstracts*, *Mineralogical Record*, or *Rocks & Minerals*, please renew early. MSA needs to forward your renewal to the those publishers before your subscription runs out.

- MSA members have several subscription options for the *American Mineralogist*: not subscribe, subscribe to the paper + online versions, or subscribe to the online version only. About three-quarters of MSA members subscribed to the journal in some form in 2003. This is comparable to 2002, but a drop from previous years:

year	%paper	%online	%no journal
1995	94		6
1996	94		6
1997	92		8
1998	89		11
1999	88		12
2000	90		10
2001	78		22
2002	67	12	21
2003	61	15	24

The abrupt decrease in subscriptions from 2000 to 2001 is attributed to a revised membership renewal form that made it obvious that MSA members need not subscribe to the journal. It was also the year after the journal went online (for free). The further drop in paper subscriptions from 2001 to 2002 reflects the option for members of subscribing to the online version only. The decline in subscriptions over the years also results in part from increasing numbers of senior members who usually do not subscribe.

- The lease on of the MSA office space expires in August 2005. MSA's space needs includes office space for the Business and Editorial Offices, as well as warehouse space for its publications and order fulfillment. MSA's next location will probably be what is called flex-space, a combination office and warehouse. In order to keep expenses low at the same time minimizing the adverse impact on the MSA staff, the location will remain in the Washington, DC area, but likely in the more distant suburbs. The MSA Long-Term Planning Committee has outlined some general criteria for the move and the next six months will be devoted to finding a suitable space and planning for the move. Planning will include determining the probability of obtaining sales and use tax exemption in any new jurisdiction, telephone system, internet access, mailing permits in the new location, identifying corporate agent in DC, and moving while still keeping the functions of the offices going. You will hear more about the move as we know more. You should expect occasional admonishments to anticipate and plan any needs

from the MSA offices about the time of the move during July or August 2005.

- MSA has changed the way it sends much of its non-US destination mail. Previously the journals and books were sent by US Postal Service (USPS) surface mail. Overseas mailings of *The Lattice*, ballots, renewal notices, and grant and lecture announcements were air printed matter. A new vendor, Postal Logistics, uses a variety of postal administrations and the USPS to airlift the material to postal administration distribution centers worldwide for insertion into a mail piece's destination country's mail stream. Postal Logistics addresses and polybags *The Lattice*, tasks we did previously. The service is comparable to the USPS International Surface Airlift (ISAL) service, but at lower costs and with no minimum piece and weight requirements. The cost savings is mixed, but the most important advantage is quicker delivery for the books and journal and, because all the material is sent as printed matter, no need for customs declaration. Delivery times for Reviews appear to have gone from 2-4 months to 4-5 weeks. Not preparing customs declaration saves the office 1-2 hours per order batch. Customers are unlikely to be charged a customs duty, but if they are, the rate ought to be 30¢ per pound rather than some percentage of retail value.

- The Geological Society of America (GSA) hosts a meeting of its Associated and Allied Societies during February of each year. GSA is updating its strategic plan and at the February 2004 meeting, GSA posed several questions as a way of obtaining ideas for that revision. One question was what are the most challenging business and operational constraints facing MSA.

MSA is a discipline-based society whose major focus is its professional members. MSA likes to think that the disciplines it represents are fundamental, but it does face several challenges:

Can such a society remain viable when its subject matter is applied over a large number of diverse fields? For example, will an astronomer studying diamonds abundant in cosmic dust feel enough in common with the biologists who recently reported on the iron-sulfide hard parts of a new snail living at ocean floor hydrothermal vents for both to realize they are doing mineralogy, join together, and support an organization like MSA?

Can we make our professional colleagues in other areas of the earth sciences aware of the importance of natural materials? Or more exactly, sufficiently aware to see the need to require understanding and competency in crystallography, geochemistry, mineralogy, and petrology so these are not the first to be sacrificed to make room for newer requirements because someone may have had a traumatic crystallography experience as an undergraduate? Is there any advantage to being able to model the deep interior of terrestrial planets from remote sensing data if you are clueless about high-pressure minerals?

Will people support traditional societies in an Internet age with the easy and widespread accessibility to online society journals through institutional libraries and the creation of

“virtual” societies either by commercial firms, individuals, or grant-supported initiatives?

The remaining challenges are the uncertainties all societies face today—moving from traditional to electronic publications, meetings, and more members world-wide.

- The ad from the Geological Society London (GSL) in this issue is offering *Rock-Forming Minerals Volumes 3A* (second edition) **Micas** and *4B* (second edition) **Framework Silicates, Silica Minerals, Feldspathoids, and Zeolites** by W. A. Deer, R. A. Howie, and J. Zussman to MSA members at reduced prices. MSA members can save over 50%, but the offer is available for a limited time. If you are interested consider taking advantage of the offer now. Also included in this issue is an order form from the Geochemical Society (GS). GS has two recent publications and MSA are entitled to a 25% membership discount on GS publications if you are interested in these or any previous GS publications.

- According to the MSA By-Laws, a member qualifies for Senior Member or Senior Fellow status if they have reached the age of 65, retired from fulltime professional employment, and have been a member of the Society for at least 30 years. Senior Members and Fellows retain all benefits of MSA membership (receiving the newsletter, voting, etc.), but need not pay dues. You can subscribe to the paper or electronic version of *American Mineralogist* or other journals, purchase Society publications, and attend short courses all at member rates. Senior Members and Fellows receive a membership “renewal” form each year that they can use to update their contact information, subscribe to journals, purchase publications, donate to the Society, etc. If you are interested in senior status, select Senior Member or Fellow dues on your next renewal and write us in the text box that you would like to become a senior member.

- Thus far this year, the MSA booth was at the 50th Anniversary Tucson Gem and Mineral Show, Tucson, AZ, February 12-15, 2004. MSA had a “display-only table” at the Copenhagen Goldschmidt meeting June 5-11, 2004. The MSA Awards Luncheon, MSA Presidential Address, Annual Business Meeting, and joint MSA-Geochemical Society Reception will be at the Annual Meeting with Geological Society of America (GSA) in Denver, CO will all be on Tuesday, November 9, 2004. MSA will have a booth in the Exhibit Hall. Further information, as well as meeting and housing registration forms are at <<http://www.geosociety.org/>>.

- MSA will again have activities at the Annual Meeting of the Geological Society of America (GSA) in Denver, CO, to be held November 7–10, 2004. The MSA Awards luncheon, MSA Presidential address, annual business meeting, and joint MSA-Geochemical Society Reception will all be on Tuesday November 9, 2004. MSA will have a booth at the Tucson Gem and Mineral Show, Tucson, AZ (February 10-13, 2005), Goldschmidt Conference, Moscow, Idaho, USA (May 20-24, 2005) and GSA Meeting, Salt Lake City, Utah (October 16-19, 2005).

A historical glimpse at a modern group of environmentally interesting minerals

By Juraj Majzlan, Department of Geosciences, Princeton University, Princeton NJ 08544, U.S.A. (jmajzlan@princeton.edu)

There are almost 4000 mineral species known today, and the list is steadily growing. Just as people do, minerals also claim their “15 minutes” of fame. The reasons for fame, or rather attention, vary among different groups of minerals. Some minerals are simply too common to be overlooked. Quartz is a good example. The status of others owes to their beauty, guaranteeing them a steady place among the gems. Everyone knows diamond, at least by name. Names of some minerals are found in materials science literature much more frequently than in mineralogy texts, because they denote a specific structure type. Ever heard of delafossite? Check out the literature on transparent conducting oxides or frustrated magnets.

Yet other minerals come into the spotlight because of their association with ailments of the natural environment. For example, the solids precipitating from acid mine drainage waters fall into the rubric of environmentally interesting minerals. During my experimental work on these minerals, I found an intriguing array of historical papers and books, which reveal the thorny path taken by early mineralogists before the chemical composition and physical properties of these minerals had been sorted out. After accumulating several such sources, I decided to arrange and summarize them in this short manuscript that may be of interest to other mineralogists and friends of minerals.

BEGINNING OF THE STORY — PYRITE

The story of acid mine drainage (AMD) begins most commonly with the mineral pyrite (FeS_2). AMD pollution is so common because of three unique characteristics of pyrite. First, pyrite is the most common sulfide in the geological material accessible to us. Already in 1816 Cleaveland noticed that

“Few minerals are more universally diffused, than Sulphuret of iron [pyrite], especially the common variety, which extends from primitive rocks to alluvial earths. ... There is scarcely a metallic vein or bed, which does not contain Pyrites.”

Second, as abundant as it is, pyrite is not a highly valued iron or sulfur ore. Pyrite is a poor choice as an iron ore because of its high sulfur content. Auriferous pyrite is of greater interest, but not every pyrite body contains sufficient gold. Pyrite is mostly considered as waste, and left on dumps and in tailing impoundments. Third, when exposed to oxygen in the atmosphere and water, pyrite decomposes quickly, giving off soluble iron and sulfuric acid. Cleaveland (1816) stated that

“[Pyrite] is chiefly valued for the sulphate of iron (copperas) which it affords by decomposition; — a change, which some varieties undergo much more readily than others. In this process, the sulphur re-

ceives oxygen [sic] from the air, or from moisture, and is converted into sulphuric acid.”

It is through this process that the acid mine drainage waters are formed. These waters are rich in metals and sulfate, and can precipitate a large number of secondary minerals away from the original pyritic source.

GREEN WATER, GREEN MINERALS

In the first step of AMD formation, pyrite is oxidized and Fe^{2+} , SO_4^{2-} , and H^+ are released into the aqueous solutions. The exact mechanism of this process escapes our understanding even today. The consequences of these reactions, however, are readily observed. Concentrated Fe^{2+} and sulfate solutions typically exhibit a green color, and usually precipitate melanterite ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$), a mineral with bluish green color when fresh. Other ferrous sulfates, such as rozenite ($\text{FeSO}_4 \cdot 4\text{H}_2\text{O}$) or szomolnokite ($\text{FeSO}_4 \cdot \text{H}_2\text{O}$), are much less abundant than melanterite. Historically, melanterite turns out to be the most commonly mentioned AMD mineral. Jameson (1816) described this mineral as iron-vitriol, or sulphate of iron, which

“... is always associated with iron-pyrites, by the decomposition of it is formed. ... The Melanteria, or Inkstone of Pliny, the pais atramentarius flavus of Wallerius, appear to be varieties of this mineral.”

Associated with melanterite was aluminite $\text{Al}_2(\text{SO}_4)(\text{OH})_4 \cdot 7(\text{H}_2\text{O})$, an aluminum sulfate AMD mineral. Jameson (1816) describes that aluminite

“and the selenite [gypsum] with which is accompanied, is formed by the decomposition of iron-pyrites; the sulphuric acid thus formed is supposed to unite with the lime and alumina; with the lime it forms sulphate of lime or selenite, and with alumina an alum, with a superabundance of alumina.”

In the American early literature, Dana (1848) makes a brief mention of minerals related to acid mine drainage. He devotes most space to melanterite under the name “copperas,” describing the mineral as “*monoclinite, generally pulverulent or massive*”. Besides melanterite, he also mentions coquimbite [$\text{Fe}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$] and fibro-ferrite [$\text{Fe}(\text{SO}_4)(\text{OH}) \cdot 5\text{H}_2\text{O}$]. Dana (1848) also concluded that these minerals originate by weathering of pyrite, and notes that about 1800 tons of copperas are used in the United States annually, for preparation of ink, manufacture of Prussian blue, and calcination to prepare polishing powder based on hematite (“*brownish-red oxyd of iron*”). Hence, acid mine drainage minerals were probably a welcome contribution of income in mining settlements. Melanterite was therefore regarded as a useful, not detrimental mineral. Acid mine drainage was not all that bad in those times.

WHAT TO CALL RUST IN LATIN

The aqueous ferrous iron is unstable in contact with atmospheric oxygen, and quickly oxidizes to ferric iron. Ferric iron rapidly precipitates from solutions, and an assortment of rusty colored minerals, from jarosite $[KFe_3(SO_4)_2(OH)_6]$ to rhomboclase $[(H_3O)Fe(SO_4)_2 \cdot 3H_2O]$, can be formed (see Posnjak and Merwin 1922).

One of the most common AMD minerals is jarosite. Jarosite was described for the first time in the middle of 19th century. The type locality is, not surprisingly, an AMD discharge at a sulfide ore mine in the Barranco Jaroso region in Spain. Besides the careful description of the mineral assemblages in the original paper by Breithaupt (1852), it is worth noticing that to name minerals, Breithaupt used the system introduced by the Swedish naturalist Carl Linnæus in the eighteenth century (see Table 1). Jarosite was described under the Latin name *Jarosites kalicus* (Fig. 1) similar to that for the previously known mineral, alunite, *Alunites kalicus*. Not everyone was using the Linnæus' system at that time. The binomial Latin system for mineral names was criticized much earlier, for example by Aikin (1815). Aikin's system

TABLE 1. Mineral names used by Breithaupt (1852), compared to modern names.

systematic Latin names	common German names	modern names
<i>Carbonites ferrosus</i>	Eisenspath	siderite
<i>Thiodinus strontosus</i>	Zölestin	celestine
<i>Thiodinus barytosus</i>	Schwerspat, Baryt	barite
<i>Galena synthetica</i>	Antimonischer Bleiglanz,	stibnite
<i>Galena plumbea</i>	Gemeiner Bleiglanz	galena
<i>Tribasites bournonites</i>	Bournonit	bournonite
<i>Blenda zincea</i>	Braune Zinkblende	sphalerite
<i>Chalcopyrites vulgaris</i>	Kupferkies	chalcopyrite
<i>Jarosites kalicus</i>	Jarosit	jarosite



FIGURE 1. The definition and description of jarosite by Breithaupt (1852).

of mineralogy listed the mineral names almost in the same form in which they are used today.

Breithaupt (1852) characterizes the physical properties of the new mineral and describes its crystal form as a rhombohedron (Fig. 1). The chemical analysis of jarosite by Breithaupt (see Fig. 1) can be recalculated to a formula $K_{0,79}(Fe_{3,65}Al_{0,19})(SO_4)_2(OH)_{5,68}$. The trivalent cation site in jarosite should not be populated by more than 3 atoms per formula unit; the Fe_2O_3 concentration in Breithaupt's analysis is too high. Particularly appealing is the testimonial for the precision and accuracy of the analysis (see Fig. 1 for the original text, just above the analysis): "The chemical analysis was attempted by a young, good chemist ...". Being young and good was an assurance that the data are trustworthy. How nice!

CHEMICAL COMPOSITION OF AMD MINERALS

Several years after Breithaupt's description of jarosite, Rammelsberg (1860) compiled his book on systematic mineralogy "Mineralchemie". In contrast with Breithaupt, Rammelsberg did not use the Latin names and kept to the mineral names in the form that we know today. In addition, he attempted to re-calculate the published chemical analyses to chemical formulae. To do so, then and today, one needs to know the atomic weights of individual elements. Rammelsberg gives a list of known elements with their relative atomic weights (Fig. 2). Oxygen was assigned the weight of 100, and other elements were scaled to this weight. The comparison between modern atomic weights and those published by Rammelsberg (Fig. 3) show a number of discrepancies. The atomic weight of many elements is double the value it should be.

Atomgewichte der Elemente, wie sie in dem vorliegenden Werke bei den Rechnungen benutzt sind.

Aluminium	Al = 474	Molybdän	Mo = 573,5
Antimon	Sb = 1204	Natrium	Na = 287,5
Arsenik	As = 910	Nickel	Ni = 362,5
Baryum	Ba = 857	Niob	Nb = 614
Beryllium	Be = 86,5	Osmium	Os = 1250
Blei	Pb = 1294,6	Palladium	Pd = 664
Bor	B = 136,2	Phosphor	P = 387,5
Brom	Br = 1000	Platin	Pt = 1237,5
Calcium	Ca = 250	Quecksilber	Hg = 1250
Cer	Ce = 575	Rhodium	Rh = 630
Chlor	Cl = 413,3	Ruthenium	Ru = 630
Chrom	Cr = 329	Sauerstoff	O = 100
Didym	Di	Schwefel	S = 200
Eisen	Fe = 350	Selen	Se = 195,3
Fluor	Fl = 437,5	Silber	Ag = 1350
Gold	Au = 2458	Stickstoff	N = 175
Jod	J = 1586	Strontium	Sr = 518
Iridium	Ir = 1232	Tantal	Ta = 860
Kadmium	Cd = 690,8	Tellur	Te = 802
Kalium	K = 189	Thorium	Th = 744
Kiesel	Si = 185	Titan	Ti = 300
Kobalt	Co = 375	Uran	U = 743
Kohlenstoff	C = 75	Vanadin	V = 856,8
Kupfer	Cu = 396,6	Wasserstoff	H = 12,5
Lanthan	La = 380	Wismuth	Bi = 2600
Lithium	Li = 82,5	Wolfram	W = 1150
Magnesium	Mg = 150	Yttrium	Y = 437,5
Mangan	Mn = 337,5	Zinn	Zn = 405,6
		Zirkonium	Zr = 538,5

FIGURE 2. A list of elements with their atomic weights, as given by Rammelsberg (1860).

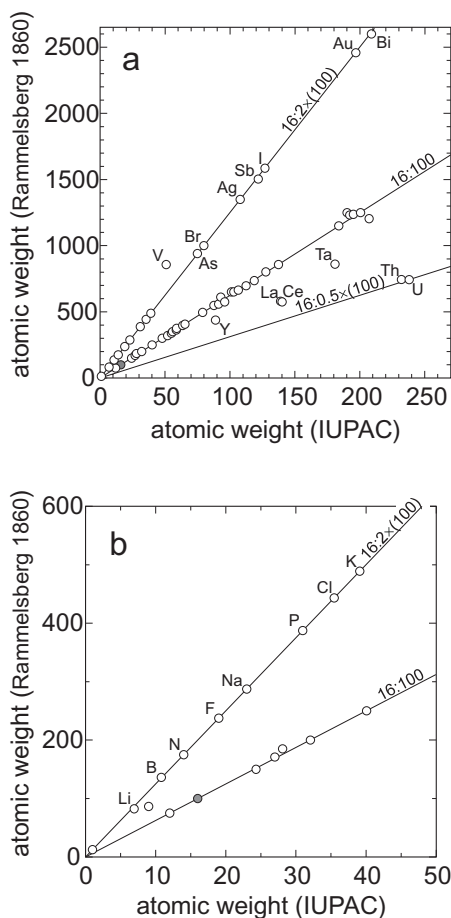
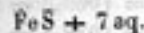


FIGURE 3. (a) Modern atomic weights versus atomic weights reported by Rammelsberg (1860). Rammelsberg (1860) normalized the atomic weight with respect to a weight of 100 assigned to oxygen. The data point for oxygen shown shaded. The lines show the ratio between the modern atomic weight of oxygen (16) and the deviation from Rammelsberg's atomic weight of oxygen (100). Only elements whose atomic weights were known without large errors are labeled. See Figure 2 for numerical values. (b) Detail of a.

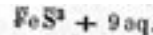
These elements notably include alkali metals and halogens. The discrepancies in atomic weights had interesting consequences. While it was correctly known that oxides of iron have the composition FeO and Fe_2O_3 , the alkali metal oxides were assigned the compositions, LiO , NaO , and KO . In other words, alkali metals were considered divalent. We should consider, however, that Rammelsberg's *Mineralchemie* was printed nine years before Dmitriy Mendeleev published his idea of the periodic arrangement of the elements and built firmer ground for detection of errors in the atomic weights. The element "didym" that is not assigned an atomic weight, was later shown to be a mixture of Nd, Pr, and Gd.

Even the symbols used are different from the chemical formulae we are accustomed to today. The dots over metals ions indicate oxygen atoms, for example, the symbols $\overset{\cdot}{\text{Fe}}$ and $\overset{\cdot\cdot}{\text{Fe}}$ mean FeO and Fe_2O_3 , respectively. The simplest formula to read is the one for melanterite (Fig. 4), $\text{FeO} \cdot \text{SO}_3 \cdot 7\text{H}_2\text{O} = \text{FeSO}_4 \cdot 7\text{H}_2\text{O}$. Another easy one is the formula of coquimbite (Fig. 4), $\text{Fe}_2\text{O}_3 \cdot 3\text{SO}_3 \cdot 9\text{H}_2\text{O} = \text{Fe}_2(\text{SO}_4)_3 \cdot 9\text{H}_2\text{O}$. A complication is encountered when trying to understand the composition

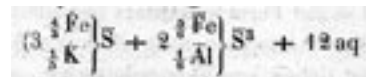
melanterite



coquimbite



voltaite



jarosite



FIGURE 4. Chemical formulae for several AMD minerals, as given by Rammelsberg (1860).

of voltaite, a mixed Fe(II)-Fe(III) mineral with a modern nominal composition of $\text{K}_2\text{Fe}_3\text{Fe}_3(\text{SO}_4)_{12} \cdot 18\text{H}_2\text{O}$. Rewriting the formula in Fig. 4 gives $3[(\overset{\cdot}{\text{Fe}}\text{S})_3\text{K}_2\text{S}_3] \cdot 2[(\overset{\cdot\cdot}{\text{Fe}}\text{S})_3\text{Al}_2\text{S}_6] (\text{SO}_4)_3 \cdot 12\text{H}_2\text{O}$. Rammelsberg considers two sites with homovalent substitution. The striking substitution is the one between Fe^{2+} and " K^{2+} ," created by the erroneous atomic weight for alkali metals, described above.

The problem of wrong atomic weight for potassium emerges also in the formula for jarosite (Fig. 4). Rammelsberg used the analysis published by Breithaupt (1852) which, as discussed earlier, overestimated the Fe_2O_3 concentration in jarosite. Rammelsberg's formula for jarosite reads $\text{KO} \cdot \text{SO}_3 \cdot 5\text{Fe}_2\text{O}_3 \cdot 4\text{SO}_3 \cdot 7\text{H}_2\text{O}$ (see Fig. 4), making it one of the most inaccurate chemical formulae for AMD minerals in his *Mineralchemie*. The current formula for jarosite is $\text{KFe}_3(\text{SO}_4)_2(\text{OH})_6$, or $\text{K}_2\text{O} \cdot 3\text{Fe}_2\text{O}_3 \cdot 2\text{SO}_3 \cdot 6\text{H}_2\text{O}$ in terms of oxides.

AT THE END

From the beneficial deposits of melanterite, collected to make ink, and interesting rusty colored mineral powders, acid mine drainage evolved to a serious problem at countless sites (Lyon et al. 1993). The number of papers that contain the concept "acid mine drainage" exceeds 10,000 today, with most of them being generated over the last decade or two. That mentioned, these papers do not even include all the experimental work on common AMD minerals such as ferrihydrite or schwertmannite, and on the ions and molecules binding on surfaces of minerals, and so on. With an ever growing number of pages published on acid mine drainage, I think it is fascinating to look back from time to time, and examine the few yellowish pages that hold information which is considered a common knowledge today.

ACKNOWLEDGMENTS. I am grateful to Jean Tangeman for reading and significantly improving the manuscript.

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President's Letter, continued from page 3

ments and particularly warm welcomes), make entertaining reading. As with research grant funds, the Outreach Fund has grown steadily through member generosity. It has also been supported by donations from industrial benefactors, through the Benefactors Committee of the society. The program now has three lecturers each year, who crisscross the Atlantic in tours of North America and Europe and visit all types of colleges and universities. There has also been one visit to the Middle East. This year the lecturers are David Vaughan, Rod Ewing, and John Hanchar. They have tours of the US, Canada, and Europe but the program organizer, Helen Lang, has recently received requests for MSA Lecturers to visit South Africa and New Zealand. There are plans to expand the program further and anyone who would like have an MSA Lecturer visit them should get the information they need from the website. The most successful tours involve each lecturer visiting a number of institutions within reasonable traveling distance of each other, so please encourage your neighbors to send in requests as well.

MSA's website contains pages dedicated to "K-12 Education," "Ask-a-Mineralogist," and "Collectors Corner". As with other aspects of the MSA's activities, support is both financial from members' donations (through the Outreach Fund) and "in kind" from members generously giving their time. Last year there were, remarkably, 972,806 hits on the Mineralogy-4 Kids pages alone (about 43% of the total hits on the MSA website), suggesting that we are reaching out to the wider community that we hope to serve and influence.

So—thanks to all of you have donated time or money during the last year. Please keep your correspondence with the President going and encourage your colleagues to participate in all the affairs of MSA, whether through applications for grants, requests to have a visit from the MSA Lecturers or nominations for the MSA award, the Dana Medal, the Distinguished Public Service Medal and the Roebling Medal. Another scheme in which you can participate is the American Mineralogist Undergraduate Award (www.minsocam.org/MSA/Awards/UnderGrad_Award.html). This award program recognizes students who have shown an interest and ability in the discipline of mineralogy. Outstanding students are nominated by members of their departments. They receive a certificate, a RiMG volume of their choice, and a student membership of MSA with electronic access to the American Mineralogist.

AM MIN STATS AT A GLANCE (FOR JUNE)

No. of Pending Manuscripts 101
 No. of New Manuscripts Submitted: 15
 No. of Accepted Manuscripts: 38 (queued)
 No. of Declined Manuscripts: 7
 No. of Withdrawn Manuscripts: 2
 No. of revisions pending: 50

Submit papers at <http://minsocam.allentrack.net>

Biogeosciences.org Launches

An innovative new Web site, www.biogeosciences.org, bridging the earth and life sciences went online June 8th, providing a single resource for all things related to biogeoscience. Biogeosciences.org is a natural home for biogeoscience discussions, resources, and promotion. The non-commercial Web site, supported by a grant from the Biogeosciences Program of the National Science Foundation, draws from several partnered professional societies* and elsewhere to present an outstanding collection of biogeoscience resources for all levels of education and interest. The dynamic Web site is expected to grow and change reflecting the trends in biogeoscience and usage needs. Basic biogeoscience links, background information, and program resources are available along with more detailed information on jobs, funding, and research opportunities. The new Web site has comprehensive lists of degree and research programs, applicable journals and other publications, and a complete database of relevant conferences and meetings featuring special sections and associated symposia. A discussion forum allows for the rapid dissemination of ideas and opinions and addresses some of the most important issues facing biogeoscience today. Another interactive feature is an image gallery where pictures are exchanged freely for educational purposes. The growing collection of biogeoscientists is highlighted by interviews and information on what types of research biogeoscientists are presently working. Interviews with various program managers elicit the particulars of the funding process and provide insight into research funding decisions and important statistics.

Interested parties should contact Sarah Leibson, Biogeosciences.org Web Coordinator at web@biogeosciences.org, (303) 357-1095. Content related suggestions or comments are warmly encouraged.

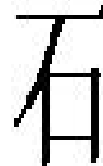
*American Geophysical Union, American Society of Limnology and Oceanography, European Geosciences Union, Ecological Society of America, Geochemical Society, Geological Society of America, Mineralogical Society of America, and the Soil Science Society of America

26th FM-TGMS-MSA Mineralogical Symposium

Minerals of China

in conjunction with the Tucson Gem and Mineral Show

Saturday February 12, 2005



The twenty-sixth mineralogical symposium held in conjunction with the Tucson Gem and Mineral Show will take place on 12 February 2005. It is sponsored by the Friends of Mineralogy (FM), the Tucson Gem and Mineral Society (TGMS), and the Mineralogical Society of America (MSA). The symposium topic is the same as the show theme: *Minerals of China*. Papers on descriptive mineralogy, paragenesis, classic and new locations, and related subjects about the topic are welcome. An audience of amateur and professional mineralogists and geologists is expected.

Anyone wanting to present a paper should submit a 200- to 300-word abstract to Dr. William B. Simmons, Department of Geology and Geophysics, University of New Orleans, New Orleans, LA 70148; phone 504/280-6791; fax 504/280-7396; e-mail wsimmons@uno.edu. Presentations will be twenty minutes long, followed by a period for questions. Abstracts must be submitted by 21 September 2004.

CONTRIBUTORS AND BENEFACTORS

Many members contribute to MSA each year by including a contribution with their dues. Depending on the wishes of the member, the money is deposited with the principal of the MSA Endowment, MSA Mineralogy/Petrology, MSA Outreach, or Edward H. Kraus Crystallographic Research Funds. The income of these four Funds are to support MSA's research grants in crystallography, mineralogy, and petrology; publishing of the *American Mineralogist*; the *American Mineralogist* Undergraduate Awards; the Mineralogical Society of America Award; the Distinguished Public Service Award, the Dana Medal, the Roebling Medal; the website, and the lectureship program.

Between 7/12/2003 and 6/18/2004, 565 MSA members and organizations contributed \$25,495.50 to MSA Funds: Endowment (\$13,592), Kraus (\$1,852), Mineralogy/Petrology Fund (\$5,969.50), and Outreach (\$4,082). If you have not done so previously, you might want to consider contributing at the next opportunity. Here we want to extend our gratitude to the following individuals and

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MEMBER IN THE NEWS

Nancy Ross of Blacksburg, Va., professor of mineralogy in the College of Science at Virginia Tech, has been named the college's associate dean for research, graduate studies, and outreach.

In this role, Ross will: coordinate research activities within the college; find new opportunities for funding faculty research; represent the research aspects of the college at both university and national levels; and manage research, graduate, and outreach administration within the college.

**Clathrate special section –
upcoming in the August/September 2004 issue
of *American Mineralogist***

Clathrate hydrates, which include natural gas that could provide a transition to a hydrogen-based economy, is the topic of a special section in the August/September issue of *American Mineralogist*, with wide-spread implications not only for many areas of Earth science but for our world. These compounds are of an immediate and practical concern because of the hazards they pose to gas and oil drilling and production operations in both deep marine and onshore Arctic environment. Drilling operations have encountered gas kicks, blowouts, and fires when gas hydrates are penetrated. Blockages can occur in pipelines. Discharge of methane into the atmosphere contributes to global warming, although climatologists and geophysicists are hotly debating this topic. Read about hydrate structure, physics, chemistry, the challenge of hydrate kinetics, and more!

Preface to the *Clathrate Hydrates* special issue
BRYAN C. CHAKOUMAKOS (CLATHRATES SPECIAL ASSOCIATE EDITOR)

Introductory overview: Hydrate knowledge development
E. DENDY SLOAN

Scanning Electron Microscopy investigations of laboratory-grown gas clathrate hydrates formed from melting ice, and comparison to natural hydrates

LAURA A. STERN, STEPHEN H. KIRBY, SUSAN CIRCO, AND WILLIAM B. DURHAM

Dynamics of trimethylene oxide in a structure II clathrate hydrate
C. Y. JONES AND I. PERAL

The stability of methane hydrates in highly concentrated electrolyte solutions by differential scanning calorimetry and theoretical computation

DIDIER DALMAZZONE, DANIELE CLAUSSE, CHRISTINE DALMAZZONE, AND BENJAMIN HERZHAFT

The effect of elevated methane pressure on methane hydrate dissociation
SUSAN CIRCO, LAURA A. STERN, AND STEPHEN H. KIRBY

Methane hydrate formation in partially water-saturated Ottawa sand
W.F. WAITE, W.J. WINTERS, AND D.H. MASON

Methanol – inhibitor or promoter of the formation of gas hydrates from deuterated ice?
SVILEN BOBEV AND KIMBERLY T. TAIT

Investigating the performance of clathrate hydrate inhibitors using in situ Raman spectroscopy and differential scanning calorimetry

ANGELA CARSTENSEN, JEFFERSON L. CREEK, AND CAROLYN A. KOH

Physical properties and rock physics models of sediment containing natural and laboratory-formed methane gas hydrate

WILLIAM J. WINTERS, INGO A. PECHER, WILLIAM F. WAITE, AND DAVID H. MASON

Experimental studies on the formation of porous gas hydrates
GEORGI GENOV, WERNER F. KUHS, DOROTEYA K. STAYKOVA, EVGENY GORESHNIK, AND ANDREY N. SALAMATIN

Investigation of jet breakup and droplet size distribution of liquid CO₂ and water systems—implications for CO₂ hydrate formation for ocean carbon sequestration

DAVID RIESTENBERG, ELIZABETH CHU, MONSURU GBORIGI, LIYUAN LIANG, OLIVIA R. WEST, AND COSTAS TSOURIS

Measurement of clathrate hydrate precipitation from CO₂ solution by a nondestructive method
YONGCHEN SONG, BAIXIN CHEN, MASAHIRO NISHIO, AND MAKOTO AKAI

Influence of water thermal history and overpressure on CO₂-hydrate nucleation and morphology
O.Y. ZATSEPINA, D. RIESTENBERG, S.D. MCCALLUM, M. GBORIGI, C. BRANDT, BRUCE A. BUFFETT, AND T.J. PHELPS

Growth-controlling processes of CO₂ gas hydrates
S. HIRAI AND H. SANDA

Thermodynamic prediction of clathrate hydrate dissociation conditions in mesoporous media
MARIA LLAMEDO, ROSS ANDERSON, AND BAHMAN TOHIDI

Modeling dynamic marine gas hydrate systems
WENYUE XU

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Aggarwal, Dr. Jugdeep, Univ of California-Santa Cruz, Santa Cruz CA. (member-5/3/04).

Akasaka, Dr/Prof Masahide, Shimane University, Shimane, JAPAN. (member-3/9/04). MI, CC, IP, MP, GE, PE, EG, CM, IM, PM, TP.

Alexandratos, Ms. Vasso G. Stony Brook NY. (student-3/4/04). MI, GE, CM, EM, GM, TC, MS, BM.

Banerjee, Dr. Neil R. University of Bergen, Bergen, NORWAY. (member-4/14/04). MP.

Barling, Dr. Jane, Univ of British Columbia, Vancouver BC, CANADA. (member-3/25/04).

Barnes, Ms. Elspeth M. Vancouver BC, CANADA. (student-6/9/04). MI, CC, IP, GE, EG, GM, PM,

Barrat, Prof. Jean-Alix, Univ de Bretagne Occidentale, Plouzané, FRANCE. (member-3/25/04). MI, IP, MP, GE, PM, TC, BM.

Beard, Mr. Richardson, Severna Park MD. (member-3/4/04). MI, GE,

Beloso Jr. Mr. Abelardo D. Univ of Illinois @ Chicago, Chicago IL. (student-3/9/04). EG, EM, GE, IP, MI, MP, PE, SP, TC, BM.

Bennett, Dr. Philip, Univ of Texas-Austin, Austin TX. (member-3/25/04).

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Brinckerhoff, Mr. William B. Johns Hopkins University, Laurel MD. (member-5/student/04).

Bryant, Mr. Jason A. Univ of South Carolina, Columbia SC. (student-5/27/04). IP, GE,

Brzostowski, Dr. Matthew A. Houston TX. (member-5/student/04). MI, EG, PM,

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Deal, Ms. Kimberly S. Washington University, Saint Louis MO. (student-3/25/04). MI, PP, IP, MP, SP, CM, PM,

Demouchy, Ms. Sylvie A. Bayerisches Geoinstitut, Bayreuth, GERMANY. (student-3/3/04). MI, CC, IP, GE, PE, GM,

DePangher, Dr. Michael, Spectrum Petrographics Inc, Winston OR. (member-3/9/04). MI, CC, IP, MP, SP, GE, EG, CM, IM, PM, OTHER, OPTICAL MINERALOGY

Deschamps, Mr. Pierre, CEREGE, Aix-en-Provence, FRANCE. (student-4/6/04).

DeViney, Mrs. Mary Loose, Keswick VA. (student-4/14/04). MI, CC, PP, IP, MP, SP, GE, PE, EG, CM, IM, EM, GM, PM, TC, TP, BM, OTHER, GEMOLOGY, GEOLOGY

Dodds, Mr. John E. Columbia MO. (student-4/7/04). MI, IP, GE, PM,

Doersam, Mr. Guido, Wormerveer, NETHERLANDS. (member-5/27/04).

Douthitt, Mr. Charles B. Saford AZ. (member-3/25/04).

Downs, Mr. Jason P. Yale Uni-

versity, New Haven CT. (student-4/7/04). MI, CC, BM, OTHER, BIOMINERALOGY

Druempel, Ms. Kirsten, Technische Universität Berlin, Berlin, GERMANY. (member-5/21/04).

Dubost, Mr. Vincent, Univ Paris Sud Orsay, Copenhagen, DENMARK. (student-5/27/04).

Duff, Ms. Martine C. Savannah River Site, Aiken SC. (member-3/3/04).

Eglington, Mr. Bruce Melville, University of Saskatchewan, Saskatoon SK, CANADA. (member-4/28/04).

Farkas, Mr. Juraj, University of Ottawa, Ottawa ON, CANADA. (student-4/28/04).

Gautason, Dr. Bjarni, ISOR-Icelandic Geosurvey, Akureyri, ICELAND. (member-5/student/04).

Geisler-Wierwille, Dr. Thorsten, Westfälische Wilhelms-Universität Muenster, Muenster, GERMANY. (member-3/25/04). MI, PP, GE, EM,

Giesting, Mr. Paul Arthur, South Bend IN. (student-5/5/04). MI, CC, PP, PE, EM, TC,

Goldman, Mr. Kevin A. Tempe AZ. (student-3/9/04). MI, IP, MP, GE, PE, CM, PM, TC,

Griffin, Mr. William R. Allen TX. (student-3/4/04). MI, CC, PP, IP, MP, GE, PE, TC,

Hahn, Mr. Brian C. Stony Brook University, Stony Brook NY. (student-4/7/04). MI, GE, SP, PM,

Hamidullah, Prof. Syed, Nat'l Centre of Excellence in Geology, Peshawar NWFP, PAKISTAN. (member-5/27/04). MI, IP, GE, EG, IM, EM, TC,

Harvey, Ms. Elizabeth J. Univ of Cambridge, Cambridge Cambridgeshire, UNITED KINGDOM. (student-3/9/04). MI, CC, PP, EG, EM,

Hatfield, Ms. Ashley K. Clinton NY. (student-6/9/04). MI, CC, IP, PM, TP,

Helbling, Ms. Angela H. Universität Heidelberg, Heidelberg, GERMANY. (student-3/9/04). MI,

IP, GE, PM,

Hinchey, Mrs. Alana M. Ottawa ON, CANADA. (student-3/25/04). IP, MP, GE, EG,

Hochstein, Ms. Joann L. University of Florida, Gainesville FL. (student-1/15/04). CC, SP, GE, PE, BM,

Hoff, Ms. Claire, Schenectady NY. (student-3/25/04).

Holcomb, Mr. Michael C. Nampa ID. (student-3/3/04). GE, BM,

Hopper, Ms. Susan F. Boonah QLD, AUSTRALIA. (student-4/28/04). SP, CM, EM, PM,

Hungerford, Mr. Jefferson D.G. Oregon State University, Corvallis OR. (student-3/9/04). MI, CC, IP, MP, GE, PE,

Iizuka, Mr. Tsuyoshi, Tokyo, JAPAN. (student-4/28/04). MI, IP, MP, SP, GE, PM, BM,

Jain, Ms. Jyoti, Delhi, INDIA. (student-3/9/04). IP, EG,

Jara, Prof. Gonzalo U. Bogota DC, COLOMBIA. (member-3/15/04). MI, CC, PP, GE, PE, EG, CM, EM, GM, TC, BM, OTHER, PARAGENESIS OF MINERALS & GEMS, CRYSTALS

Johaszova, Ms. Katarina, Baltimore MD. (student-4/26/04). MI, MP, SP, GE, TC, BM,

John, Mr. Seth Greeley, Massachusetts Inst of Technology, Cambridge MA. (student-3/25/04).

Jones, Dr. Camille Y. Nat'l Inst of Standards & Technology, Gaithersburg MD. (member-5/27/04). CC, GM, PE,

Kavanagh, Mr. Ibis Orion, Covington LA. (student-5/student/04). MI, CC, IP, MP, GE, PE, EG, PM, TC, TP, MS,

Kinyanjui, Mr. David Mwangi, Paris, FRANCE. (student-5/6/04).

Kirwin, Mr. John, Ivanhoe Mines Ltd. Bangkok, THAILAND. (member-4/14/04). MI, IP, EG, GM, TP, OTHER, MINERAL COLLECTION

Klima, Mrs. Rachel L. Providence RI. (student-3/4/04). CC, GE, IP, MI, MP, PE, PM,

Kondo, Dr. Tadashi, Tohoku University, Sendai, JAPAN. (member-6/9/04). MI, CC, PP, GE, PE, PM,

Krikorian, Ms. Lori, Amherst MA. (student-3/4/04). MP,

Kruber, Ms. Claudia, Bergen, NORWAY. (student-6/17/04).

Ksiezopolski, Ms. Irena, Reseda CA. (student-3/9/04). MI, CC, MS,

Kulshrestha, Mr. Pankaj, Buffalo NY. (student-5/13/04). MI, CC, GE, PE, CM, EM, BM, OTHER, MICROBIAL-MINERAL INTER-ACTIONS

Kyono, Dr. Atsushi, University of Tsukuba, Tsukuba Ibaraki, JAPAN. (member-5/27/04). MI, CC, PP, IM, EM, PM, TC, MS, BM,

Lowitzer, Mr. Stephan, Wetzlar, GERMANY. (student-4/7/04). MI, CC, PP, IP, MP, SP,

Luo, Ms. Yun, Miami University, Oxford OH. (student-3/9/04). MI, CC, PP, IM, EM, GM, MS,

Macalady, Dr. Jennifer L. Carleton College, Northfield MN. (member-3/25/04). MI, GE, CM, EM, PM, MS, BM,

Marschall, Mr. Horst R. Universitaet Heidelberg, Heidelberg, GERMANY. (student-3/9/04). MI, IP, MP, GE,

Marshall, Dr. Brian, U S Geological Survey, Denver CO. (member-3/25/04). 19,

Martaus, Mr. Alexandr, Ostrava 8, CZECH REPUBLIC. (student-3/4/04). MI, GE,

McKay, Dr. Jennifer L. Univ du Québec a Montréal, Montréal QC, CANADA. (member-3/25/04).

Mikes, Mr. Tamas, Universitaet Gottingen, Gottingen, GERMANY. (student-5/4/04).

Mills, Mr. Stuart, Victoria, AUSTRALIA. (student-5/27/04). MI, CC, IP, GE, TP,

Monteleone, Mr. Brian D. Syracuse University, Syracuse NY. (student-5/27/04). IP, MP, GE, PE, TC,

Morris, Ms. Elizabeth Jean, Stanford University, Stanford CA. (student-4/14/04).

Mullane, Dr. Eta, Natural History Museum, London ENGLAND, UNITED KINGDOM. (member-4/14/04).

Nagashima, Ms. Mariko, Shimane University, Shimane, JAPAN. (student-3/9/04). MI, CC,

Nicolaysen, Dr. Kirsten E. Kansas State University, Manhattan KS. (member-3/9/04). IP, GE, TC,

Norton, Mr. Michael B. Tucson AZ. (student-3/25/04). MI, CC, PP, GE, PE, CM, EM, PM, TC, OTHER, PLANETARY MINERALOGY

Novak, Dr. Martin, Czech Geological Survey, Prague 5, CZECH REPUBLIC. (member-4/28/04).

Nowakowski, Mr. Marek, Reseda CA. (member-4/28/04). MI, CC, CM,

Parenteau, Ms. Mary N. Portland State University, Portland OR. (student-3/25/04). MI, GE, CM, BM,

Park, Dr. Sohyun, Muenchen, GERMANY. (member-4/28/04). CC, MI, PP, IM,

Perkins, Mr. George B. Univ of New Mexico, Albuquerque NM. (student-3/9/04). MI, IP, MP, GE,

Poirier, Mr. Andre, Univ du Quebec a Montreal-McGill, Montreal QC, CANADA. (student-3/25/04).

Pretorius, Dr. Wilma, Univ of British Columbia, Vancouver BC, CANADA. (member-3/25/04).

Ren, Dr. Minghua, University of Texas @ El Paso, El Paso TX. (member-4/7/04). MI, IP, MP, GE, EM, GM,

Rioux, Mr. Matthew E. Goleta CA. (student-2/26/04). MI, IP, MP, GE,

Roy, Dr. Amitava, Louisiana State Univ, Baton Rouge LA. (member-4/28/04). MI, CC, PP, IP, MP, GE, PE, CM, IM, EM, MS, BM,

Rubio Ramos, Mr. Marco A. Mexico D.F. MEXICO. (student-3/9/04). MI, GE, PE, EG, CM, PM,

Saenz, Mr. James P. Boston University, Boston MA. (student-3/25/04).

Salem, Dr. Shawky, Alexandria University, Al-Saray Alexandria, EGYPT. (member-6/9/04).

Sato, Prof. Hiroki, Osaka University, Osaka, JAPAN. (member-5/27/04). MI, CC, PP, IP, MP, PE, GM, PM, TC,

Schaer, Mr. Andrew Nick, Hurricane WV. (member-3/4/04). CC, GE, CM, OTHER, GEOMICROBIOLOGY

Shiel, Ms. Alyssa, Univ of British Columbia, Vancouver BC, CANADA. (student-3/25/04).

Shukkoor, Mr. Abdul, Dubai, UNITED ARAB EMIRATES. (student-6/10/04). MI,

Singer, Mr. David Marc, Stanford University, Stanford CA. (student-6/18/04). MI, CC, PP, GE, EM, PM, MS, BM,

Skittone, Mr. Paul, Staten Island NY. (student-1/30/04). MI,

SP, EM,

Skublov, Mr. Sergey G. St Petersburg, RUSSIA. (student-3/15/04). MI, MP, GE,

Standish, Mr. Jared J. Woods Hole Oceanographic Inst, Woods Hole MA. (student-4/7/04). MI, IP, GE, TC,

Stepro, Mr. Murray W. New Mexico State Univ, Las Cruces NM. (student-4/6/04).

Tilden, Mr. Robert, Laramie WY. (member-3/4/04). MI, CC, IP, MP, SP, PE, EG, CM, IM, EM, PM,

Tumiati, Ms. Simone, Univ degli Studi Dell'Insubria, Como Lombardy, ITALY. (student-3/25/04).

Uvarova, Mrs. Yulia A. University of Manitoba, Winnipeg MB, CANADA. (student-4/28/04). MI, CC, IP, MP, GE, PE, CM, GM, BM,

Villa, Mrs. Maria Antonia, Bronx NY. (student-3/29/04). EG, EM,

Vuletich, Ms. April, Queen's University, Kingston ON, CANADA. (member-3/26/04).

Weis, Dr. Dominique AM, Univ of British Columbia, Vancouver BC, CANADA. (member-3/25/04).

Weislogel, Ms. Amy L. Menlo Park CA. (student-4/28/04). SP, GE, TC, OTHER, ISOTOPE GEOLOGY

Wheatley, Mr. Patrick V. Univ of Texas-Austin, Austin TX. (student-3/25/04).

Williams, Mr. Ross W. Lawrence Livermore National Lab, Livermore CA. (member-3/25/04).

Williamson, Dr. Mark A. MFG, Inc. Fort Collins CO. (member-3/25/04). MI, GE, IM, EM,

Wittmann, Mr. Axel, Humboldt-Univ zu Berlin, Berlin, GERMANY. (student-6/18/04). MI, CC, IP, MP, SP, GE, CM, PM,

Wong, Mrs. Denise, Flushing NY. (member-3/4/04).

Yamaguchi, Dr. Kosei E. Japan Marine Sci & Tech Center, Yokosuka Kanagawa, JAPAN. (member-3/25/04).

Zayac IV, Mr. John M. Univ of California-Santa Barbara, Santa Barbara CA. (student-4/7/04). MI, IP, PP, GE, PE, PM, TC,

Ziemann, Ms. Tori M. Univ of Notre Dame, Notre Dame IN. (student-3/25/04). MI, CC, GE, EM, TC,

Meetings Calendar 2004

JUNE

June 27–July 2 11th International Symposium on Water-Rock Interaction. Saratoga Springs, NY, USA. Details: Dr. Susan Brantley, Secretary General, Dept. of Geosciences, The Pennsylvania State University, 239 Deike Building, University Park PA USA 16802. Phone: 814-863-1739 FAX: 814-863-8724. E-mail: ConferenceInfo2@outreach.psu.edu. Web page: <http://www.outreach.psu.edu/C&I/WRI/>

June 27–July 1 2004 International Basement Tectonics Association (IBTA) Conference on the Four-D Evolution of Continental Crust. Oakridge, TN, U.S.A. Details: R.D. Hatcher, Jr., Department of Geological Sciences, University of Tennessee, 305 Geological Sciences Building, Knoxville, TN 37996-1410 USA. E-mail: bobmap@utk.edu. Web page: <http://www.tectonics.org/conference/index17.html>

JULY

17–22 American Crystallographic Association (ACA) Annual National Meeting, Chicago, IL. Details: Christer Aakeroy, Dept. of Chemistry, Kansas State Univ., Manhattan, KS 66506. phone (785) 532-6096; Fax (785) 532-6666. E-mail: aakeroy@ksu.edu. Web page: <http://www.uic.edu/orgs/aca2004/>

20–23 Oxygen in the Terrestrial Planets. Albuquerque, New Mexico. Details: John Jones, phone: 281-483-5319. E-mail: john.h.jones1@nasa.gov. Web page: <http://www.lpi.usra.edu/meetings/otp2004/>

AUGUST

2–6 67th Annual Meeting of the Meteoritical Society.

Rio de Janeiro, Brazil. Details: Kimberly Taylor (LPI Meeting Coordinator), Program Services Department, Lunar and Planetary Institute, 3600 Bay Area Boulevard, Houston TX 77058-1113, USA. Phone: (1) (281) 486 2151. Fax: (1) (281) 486 2160. E-mail: taylor@lpi.usra.edu Web page: <http://www.lpi.usra.edu/meetings/metsoc2004/metsoc2004.1st.html> or <http://www.cbpf.br/~metsoc04/>

8–13 Gordon Research Conference: The Role of Water in Rock Deformation. South Hadley, MA, USA. Details: Andreas Kronenberg, Center for Tectonophysics, Dept Geology and Geophysics, Texas A&M University; OR Mark Jessell, Laboratoire des Mécanismes et Transferts en Géologie, Université Paul-Sabatier, Toulouse. E-mail: a-kronenberg@tamu.edu OR mjessell@lmtg.ups-tlse.fr. Web page: <http://www.tectonique.net/grc/>

16–20 Meteoroids 2004. University of Western Ontario, London, Ontario, CANADA. Details: Frans J.M. Rietmeijer, email fransjmr@unm.edu. Web page: http://www.obs.univ-bpclermont.fr/ima/w3/news_docs/meteoroids04.html

20–28 32nd International Geological Congress (IGC). Florence, Italy. Details: Newtours, Via A. Righi, 8-50019 Sesto Fiorentino FIRENZE-ITALY. Tel/Fax +39 055 33611; fax +39 055 3361350. E-mail: secretariat@32igc.org. Web page: <http://www.32igc.org/>

25–31 22nd European Crystallographic Meeting. Eötvös Loránd Univ, Budapest, Hungary. E-mail: ecm22.mke@mtesz.hu Web page: <http://www.ecm22.mtesz.hu/> or <http://www.hwi.buffalo.edu/ACA/>

Aug. 30–Sept. 3 2nd In-

ternational Conference on Recrystallization and Grain Growth. Annecy, France. Details: Société Française de Métallurgie et de Matériaux (SF2M), 250 rue Saint Jacques, 75005 Paris. tel.: 01 46 33 08 00–Fax: 01 46 33 08 80. E-mail : sf2mcongress@wanadoo.fr. Web site: <http://www.rex-gg-2004.org/>

SEPTEMBER

4–8 5th European Conference on Mineralogy and Spectroscopy (ECMS). Vienna, Austria. Details: Prof. Dr. Anton Beran, Institut für Mineralogie und Kristallographie, Universität, Althanstr. 14, A-1090 Wien, Österreich. E-mail: mineralogie@univie.ac.at. Web page: http://www.univie.ac.at/Mineralogie/EMU/welcome.htm?emus_6.htm~body

5–8 5th International Conference on Mineralogy and Museums. Paris, France. Details: Dr. Lydie Touret. Email: lydie.touret@ensmp.fr. Web page: <http://www.ensmp.fr/MM5>

6–11 Penrose Conference: Mass Redistribution in Continental Magmatic–Hydrothermal Systems. Yellowstone National Park and Butte, MT USA. Details: Greg B. Arehart, Department of Geological Sciences, University of Nevada, Reno, Nevada 89557-0138, USA, phone (775) 784-6470; or Peter I. Nabelek, Department of Geological Sciences, University of Missouri, Columbia, Missouri 65211, USA, phone (573) 884-6463, fax 573-882-5458. E-mail: arehart@unr.edu OR nabelekp@missouri.edu. Web page: <http://www.geo.oregonstate.edu/users/dillesj/Penrose.html>

8–10 International Sym-

posium on Earth System 2004. Istanbul, Turkey. Details: Symposium Secretariat, ODS Congress Management, Sari Asma Sok. No: 8, Yenikoy 34464, Sariyer, Istanbul, Turkey. Phone +90 212 299 99 80; Fax: +90 212 299 99 77. E-mail: secretariat@earthssystem2004.org. Web page: <http://www.earthssystem2004.org/committee/invitation.asp>

11–19 Tectonics, Magmatism and Metallogeny of Active Continental Margins (Interim International Conference on Metallogeny of the Pacific Northwest). Vladivostok, Russia. Details: Far East Geological Institute, Far Eastern Branch of Russian Academy of Sciences, 159, Prospekt 100-letiya, Vladivostok, 690022 Russia. Tel. +7(4232)31-87-50; Fax: +7(4232)31-78-47. E-mail: iagodconf@fegi.ru/ or fegi@online.marine.su. Web page: <http://www.fegi.ru/IAGOD/>

13–14 The Mineralogical Society (of Great Britain and Ireland): Environmental Mineralogy and Geochemistry Groups: Speciation and Toxicity. Birkbeck-UCL, London. E-mail: karen.hudson-edwards@geology.bbk.ac.uk or Mark Hodson, m.e.hodson@reading.ac.uk

19–22 8th International Congress on Applied Mineralogy (ICAM 2004). Aguas de Lindoia, Sao Paulo, BRAZIL. Details: D. Paktunc, CANMET, 555 Booth Street, Ottawa, Ontario K1A 0G1 CANADA. Phone: +1-613-947-7061; Fax: +1-613-996-9673. E-mail: dpaktunc@NRCan.gc.ca. Web page: www.icam2004.org

13–17 XVIIth Conference on Clay Mineralogy and Petrology. Charles University, Prague, Czech Republic. Details: Insti-

tute of Rock Structure and Mechanics, Tel +420 266009262; fax +420 284680105. E-mail: stastny@irms.cas.cz. Web page: <http://www.clays.cz/>.

19–22 8th International Congress on Applied Mineralogy (ICAM 2004). Aguas de Lindoia, Sao Paulo, BRAZIL. Details: D. Paktunc, CANMET, 555 Booth Street, Ottawa, Ontario K1A 0G1 CANADA. Phone: +1-613-947-7061; Fax: +1-613-996-9673. Email: dpaktunc@NRCan.gc.ca. Web page: www.icam2004.org

19–25 Eurogranites 2004 Field Meeting: The Galway and Leinster Granites in Ireland. Ireland. Details: Pádhraig Kennan, Geology Department, University College Dublin, Dublin 4, Ireland. OR John Reavy, Geology Department, University College Cork, Cork, Ireland. Phone: 353-21-4902886. E-mail: padhraig.kennan@ucd.ie OR j.reavy@ucc.ie.

20–24 2nd Mid-European Clay Conference. Miskolc, Hungary. Details: Dr I. Viczian E-mail: viczian@ludens.elte.hu or Dr T.G. Weisburg. E-mail: weisburg@ludens.elte.hu

26–30 Materials Science & Technology 2004, incorporating the 2004 TMS Fall Meeting and the 46th Iron & Steel Society Mechanical Working and Steel Processing Conference. New Orleans, Louisiana. Details: TMS Meetings Services, 184 Thorn Hill Road, Warrendale, PA 15086. Tel. (724) 776-9000, ext. 243; fax (724) 776-3770. E-mail: mtgserv@tms.org. Web page: www.matcitech.org

Sept. 27–Oct. 1 SEG 2004 Conference. Perth, Australia. Details: Dr Susan Ho, Secretary, SEG 2004, PO Box 80, Bullcreek WA 6149, Australia. Tel: (61 8) 9332 7350 (international) or (08) 9332 7350 (Australia). Fax: (61 8) 9310 6694 (international) or (08) 9310 6694 (Australia). E-mail: susanho@geol.uwa.edu.au. Web site: www.cgm.uwa.edu.au/geoconferences/seg2004/index.asp

Sept. 30–Oct. 1 Workshop on Hemispheres Apart: The

Origin and Modification of the Martian Crustal Dichotomy. Houston, Texas. Details: Thomas Watters, Smithsonian Institution, phone: 202-633-2483; OR Kimberly Taylor, LPI., phone: 281-486-2151, fax: 281-486-2125. E-mail: twatters@nasm.si.edu or taylor@lpi.usra.edu. Web page: <http://www.lpi.usra.edu/meetings/hemispheres2004/>

OCTOBER

4–6 Workshop on Vesuvius and Volcanism of Campania Plain, Naples, Italy. Details: Prof. B. De Vivo, Dipartimento di Geofisica e Vulcanologia, Università Napoli Federico II. Email: bdevivo@unina.it. Web page:

http://www.dgv.unina.it/ricerca/de_vivo-ves/Vesuvius_eruption.htm

11–15 Second Conference on Early Mars: Geologic, Hydrologic and Climatic Evolution and the Implications for Life. Jackson Hole, Wyoming, USA. Details: Steve Clifford, phone: 281-486-2146. E-mail: clifford@lpi.usra.edu. OR: Kimberly Taylor, phone: 281-486-2151, fax: 281-486-2125. E-mail: taylor@lpi.usra.edu. Web page: <http://www.lpi.usra.edu/meetings/earlymars2004/>

12–15 Lithoprobe Celebratory Conference: “From Parameters to Processes: Revealing the Evolution of a Continent”. Toronto, Ontario, Canada. Details: Ron Clowes, Director, Phone: +1-604-822-4138. E-mail: li@lithoprobe.ubc.ca. Web page: <http://www.lithoprobe.ca/>

19 The Mineralogical Society (of Great Britain and Ireland): Clay Minerals Group: New developments in the study of clay minerals and fine-grained materials. Details: Dr Javier Cuadros, Department of Mineralogy Natural History Museum, Cromwell Road, London, SW7 5BD. Tel: 020 7942 5543; Fax: 020 7942 5537. E-mail: j.cuadros@nhm.ac.uk. Web page: <http://www.minersoc.org/pages/meetings/CMG/>

cmgco04.

24–27 AAPG 2004 International Conference and Exhibition. Cancun, Mexico. Details: AAPG Convention Department, P.O. Box 979, Tulsa, OK 74101-0979, USA. Fax: 1-918-560-2684. E-mail: convene@aapg.org. Web page: <http://www.aapg.org/meetings/can04/index.html>

NOVEMBER

1–3 Space Resources Roundtable VI. Golden, CO, USA. Details: G. Jeffrey Taylor, Workshop Program Committee Chair. E-mail: gjtaylor@higp.hawaii.edu OR space@mines.edu. Webpage: <http://www.lpi.usra.edu/meetings/roundtable2004/roundtable2004.1st.html>

7–10 GSA Annual Meeting. Denver CO USA. Details: GSA Meetings, Box 9140, Boulder, Colo. 80301-9140, Phone: +1-303-447-2020, ext. 164. Fax: +1-303-447-1133. E-mail: meetings@geosociety.org. Web page: <http://www.geosociety.org/meetings/index.htm>

8–11 Workshop on Chondrites and the Protoplanetary Disk. Lihue, Hawai'i. Details: Alexander Krot, University of Hawai'i, phone: 808-956-3900 OR Mary Cloud, Lunar and Planetary Institute; phone: 281-486-2143, fax: 281-486-2125. E-mail: sasha@higp.hawaii.edu or cloud@lpi.usra.edu. Web page: <http://www.lpi.usra.edu/meetings/chondrites2004/>

14–19 IAVCEI 2004 General Assembly Volcanism and its Impact on Society. Pucon, Chile. Details: Jose A. Naranjo or Jorge Clavero, General Secretariat, IAVCEI 2004 GA Av. Santa Maria 0104, Providencia, Santiago, CHILE. Phone: 56-2-737 50 50; fax: 56-2-777 19 06. E-mail: iavcei@sernageomin.cl. Web page: <http://www.iavcei.org>

Nov. 29–Dec. 3 Materials Research Society 2004 Fall meeting. Boston, MA. Tel. (724) 779-3003; Fax (724) 779-8313. E-mail: info@mrs.org.

Web page: http://www.mrs.org/meetings/future_meetings.html

DECEMBER

13–17 2004 AGU Fall Meeting. San Francisco, California, U.S.A. Details: AGU Meetings Department, 2000 Florida Avenue NW, Washington, DC 20009 USA. Phone: +1-202-462-6900; Fax: +1-202-328-0566. E-mail: meetinginfo@agu.org. Web page: <http://www.agu.org/meetings>

2005

JANUARY

6–7 Environmental Mineralogy, Geochemistry and Mineral Physics Groups: Mineralogical Society Winter Meeting. Bath, UK. Details: E. Valsami-Jones. Email: E.Valsami-Jones@nhm.ac.uk. Web page: <http://www.minersoc.org/pages/meetings/Environment.htm>

FEBRUARY

13–17 The Minerals, Metals & Materials Society Annual Meeting & Exhibition. San Francisco, CA. Details: TMS Meetings Services, 184 Thorn Hill Road, Warrendale, PA 15086. Tel. (724) 776-9000, ext. 243; fax (724) 776-3770. E-mail: mtgserv@tms.org.

February 26–March 2 Sixth Keele Meeting on Aluminium. Aluminium: Lithosphere to Biosphere (and Back). Bucaco, Portugal. Details: Chris Exley, Birchall Centre for Inorganic Chemistry and Materials Science, Lennard-Jones Laboratories, Keele University, Staffordshire ST5 5BG, UK OR Paula Go lves, Department of Biology, University of Aveiro Campus Universitario de Santiago,, 3810-193 Aveiro, Portugal. Email: cha38@keele.ac.uk OR pgoncalves@bio.ua.pt. Web page: <http://www.keele.ac.uk/depts/ch/groups/aluminium/meeting2005/meeting2005.htm>

MARCH

March 28–April 1 Materials Research Society Spring

Meeting. San Francisco, CA. Details: Telephone (724) 779-3003; Fax (724) 779-8313; E-Mail: info@mrs.org. Web page: http://www.mrs.org/meetings/future_meetings.html

APRIL

10–13 107th Annual Meeting & Exposition of The American Ceramic Society. Baltimore, MD. Web page: <http://www.ceramics.org/meetings/am2005/default.asp>

25–29 European Geosciences Union (EGU), Second General Assembly. Vienna, Austria. Details: EGU Office, Max-Planck-Str. 13, 37191 Katlenburg-Lindau, GERMANY. Telephone: +49-5556-1440; Fax: +49-5556-4709; E-mail: egu@copernicus.org. Web Site: www.copernicus.org/EGU/EGU.html OR <http://www.copernicus.org/EGU/ga/egu05/index.htm>

MAY

15–18 GAC-MAC: Halifax 2005. Halifax, Nova Scotia, Canada. Details: Rob Raeside. E-mail: rob.raeside@acadiu.ca.

20–24 Goldschmidt 2005. Moscow, Idaho, USA. E-mail: gold2005@uidaho.edu. Web site: <http://www.the-conference.com/2005/gold2005/index.php>

23–27 2005 AGU Joint Assembly. New Orleans, Louisiana, U.S.A. Details: AGU Meetings Department, 2000 Florida Avenue, NW, Washington, DC 20009 USA. Phone: +1-202-777-7333; Fax: +1-202-328-0566. E-mail: meetinginfo@agu.org. Web page: <http://www.agu.org>

May 28–June 2 American Crystallographic Association (ACA) Annual Meeting. Walt Disney World, FL, USA. Details: Ed Collins, Program Chair. Email: edward_collins@med.unc.edu.

Web page: <http://www.hwi.buffalo.edu/ACA/futuremeetings.html>

JUNE

19–22 American Association of Petroleum Geologists and Society for Sedimentary Geology Joint Annual Meeting and Exhibition. Calgary, Alberta, Canada. Details: AAPG Conventions Dept., P.O. Box 979, Tulsa, OK 74119, USA. Phone: +1-918 560 2679. Fax: 1-918 560 2684. E-mail: convene@aapg.org Web page: <http://www.aapg.org/calgary/globalroundup.cfm>

19–28 EMU School: Mineral Behaviour at Extreme Conditions. Heidelberg, Germany. Email: EMU2005@min.uni-heidelberg.de. Web page: http://www.univie.ac.at/Mineralogie/EMU/emusch_7.htm

AUGUST

7–11 10th International

Platinum Symposium. Oulu, Finland. Details: Dr. Tuomo Alapieti, University of Oulu. Phone +358-8-553 1432; mobile phone +358-40-504 4599; Fax: +358-8-553 1484, Email: tuomo.alapieti@oulu.fi. Web site: <http://platinumsymposium.oulu.fi/>

8–11 Earth System Processes 2. Calgary, Alberta, Canada. Web page: <http://www.geosociety.org/meetings/esp2/>

18–21 Society for Geology Applied to Mineral Deposits, 8th Biennial Meeting. Beijing, China. Details: 8th SGA Biennial Meeting, Dr. Jingwen Mao, Secretary, Institute of Mineral Resources, Chinese Academy of Geological Sciences, 26 Baiwanzhuang Road, Beijing 100037, China. Phone: +86 10 68 32 73 33. Fax: +0086 10 68 33 63 58. E-mail: mail@sga2005.com. Web Site: <http://www.sga2005.com>.



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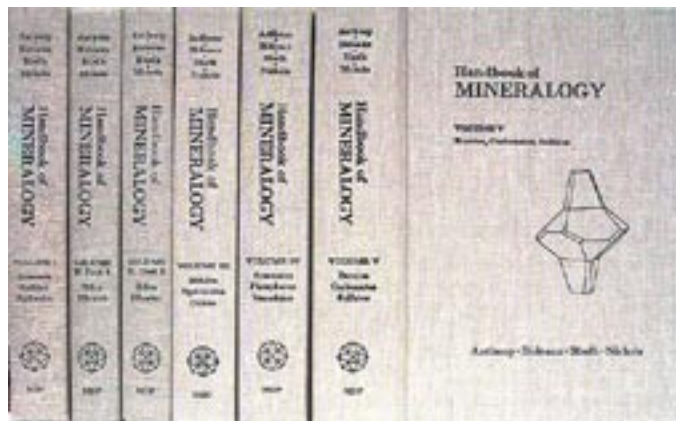
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21–27 Claysphere: past, present and future: 13th International Clay Conference. Waseda University, Tokyo, Japan. Details: Prof. T. Sakamoto. Telephone: +81-86-252-8922. Email: icc13@das.ous.ac.jp. Web page: <http://www.soc.nii.ac.jp/cssj2/13ICC/>

23–31 XX Congress of International Union of Crystallography. Florence, Italy. Details: Congress Secretariat, XX Congress and General Assembly of the International Union of Crystallography c/o Dipartimento di Energetica, University of Florence, via S. Marta 3, 50139 Firenze, Italy. Telephone ++39-055-4796209, fax ++39-055-4796342. Email: iucr@iucr2005.it. Web page: <http://www.iucr2005.it>

23–26 3rd Federation of European Zeolite Associations (FEZA) Conference. Prague, Czech Republic. Email: feza2005@jh-inst.cas.cz. Web page: <http://www.jh-inst.cas.cz/~feza2005/>

SEPTEMBER

12–16 68th Annual Meteoritical Society Meeting. Gatlinburg, Tennessee, USA.

Details: Kimberly Taylor (LPI Meeting Coordinator), Program Services Department, Lunar and Planetary Institute, 3600 Bay Area Boulevard, Houston TX 77058-1113, USA. Phone: (281) 486 2151. Fax: (281) 486 2160. E-mail: metsoc2005@utk.edu OR taylor@lpi.usra.edu. Web page: <http://geoweb.gg.utk.edu/2005/metsoc2005.html>.

19–23 From Tropics to Tundra: 22nd International Symposium of the Association of Exploration Geochemists. Perth, Western Australia. Details: Promaco Conventions Pty Ltd, ABN 68 008 784 585, PO Box 890, Canning Bridge, WESTERN AUSTRALIA 6153. Phone: + 61 8 9332 2900; Fax: + 61 8 9332 2911. Email: maco.com.au. Web site: www.promaco.com.au/conference/2005/iges

OCTOBER

16–19 GSA Annual Meeting. Salt Lake City, Utah USA. Details: GSA Meetings, Box 9140, Boulder, Colo. 80301-9140. Phone: +1-303-447-2020, ext. 164. Fax: +1-303-447-1133. Email: meetings@geosociety.org. Web page: <http://www.geosociety.org/meetings/index.htm>

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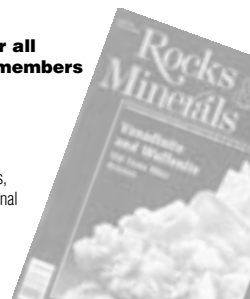
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