
CMS News

A Publication of the Clay Minerals Society

Volume 11, Number 1 Fall 1999

Jillian F. Banfield awarded MacArthur Fellowship



Jill Banfield.

Dave Pevear

Jillian Banfield has been named a 1999 MacArthur Fellow, along with 31 other creative people. Each will receive five years of unrestricted, no-strings-attached support to use as they see fit. According to the John D. and Catherine T. MacArthur Foundation, "The Fellows Program identifies, celebrates and

nurtures creativity, casting its net as broadly as possible in search of the most creative individuals." This year's Fellows are from such diverse fields as human rights, museum archives, journalism, anthropology, physics, and chemistry. Daniel J. Socolow, director of the MacArthur Fellows

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Volume 9 published —good work, Michele!

Congratulations to outgoing Special Publications Editor Michele Hluchy for all the work she put into publishing *Synchrotron X-Ray Methods in Clay Science*, Volume 9 in the CMS Workshop Lecture Series, which arrived this summer. Many people don't realize the amount of time, patience, and diplomacy that goes into getting these

projects finished. Edited by D. G. Schulze, J. W. Stucki, and P. M. Bertsch, it is based on the 1997 workshop held in Ottawa.

Articles include "Overview of Synchrotron X-ray Sources and Synchrotron X-rays," by D. Schulze and P. Bertsch; "Fundamental Aspects and Applications of X-ray Absorption Spectroscopy in Clay" *continued on page 24*

Dues notices late

This year, due to a comedy of errors, the dues renewal notices have been mailed late. As a result, the fee for late renewal has been moved up to March 1. We're sorry for the inconvenience.

Inside...

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Medical Clays: W. R. Reinbacher
Euroclay 99: G. Beall

Dublin Meeting: Dick Merriman
Common Ground World Project
New Society Manager: Leslie Shivers
Good-bye: Pat Costanzo, Jo Eberl
Don Scafe Archives Contribution
Committee Personnel

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CMS News is published irregularly by The Clay Minerals Society. Contributions of articles, letters, commentary, photographs, and drawings are welcome.

The newsletter is distributed to all CMS members. Membership rates (1999) are as follows: full membership, including a subscription to *Clays and Clay Minerals*, \$60.00/year; student membership, \$15.00/year; nonsubscribing membership, \$30.00/year. Institutional subscriptions to *Clays and Clay Minerals*: \$195.00/year (\$210.00 overseas) for the year 1999. Please contact the Society Office for information regarding new membership, and Allen Press (913-843-1221) for questions concerning current membership.

CMS News welcomes advertising. Inquire about rates to the Society Office. Articles and other contributions submitted to *CMS News* are subject to editing and are published on a space available basis. All opinions expressed herein are the opinions of individual contributors, and not of The Clay Minerals Society. Copyright © 1999 The Clay Minerals Society.

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This newsletter printed on recycled paper.

New CMS Manager

Please welcome the new CMS Manager, Leslie D. Shivers. Starting January 1, 2000, the new office can be reached as follows:

The Clay Minerals Society
P. O. Box 460130
Aurora, CO 80046-0130 USA
phone: 303-680-9002
fax: 303-680-9003
e-mail: cms@clays.org

I know Leslie will enjoy getting to know everyone in the Society as much as I have, and hope that everyone will make a special effort to meet her at the annual meeting in Chicago.

Jo Eberl
Boulder, Colorado

Join the CMS listserver!

Members are encouraged to join the listserver and to frequent the home page in order to stay informed on CMS doings. With Jo Eberl's resignation, it may be a little while before the CMS has a newsletter again, so please look for announcements on the web.

To join the CMS listserver: send an e-mail message to: majordomo@purdue.edu and write a message (in the body of the e-mail message) as follows:

subscribe clayminerals-l

Many thanks to our advertiser in this issue, **J. S. Technical Services**, for helping make this issue possible, and to the **Mineralogical Association of Canada** and the **Mineralogical Society of America** for reciprocal advertising.

New homepage address

The new, improved home page address for the CMS is: <http://cms.lanl.gov>

Student Travel Grants

The CMS awards travel grants to students who are presenting a paper at a CMS meeting. Travel grant applications are available from the Society Office. The deadline is April 1. The amount of funds given out for travel grants is dependent on the amount donated by our members, so please give generously (in the box on your dues envelopes) to support future clay scientists!

Thanks...

To the following people who contributed to this issue:

Jill Banfield
Gary Beall
Alba Y. Corral-Avitia
Pat Costanzo
Dennis Eberl
Karuna Eberl
Bob Hall
Warren Huff
Randy Hughes
Walter Keller
Jessica Elzea Kogel
Linda Kuehne
Dick Merriman
Dewey Moore
Kathryn Nagy
M. J. Nash
Dave Pevear
Rich Pollastro
W. R. Reinbacher
Don Scafe
Aka Srodon
Bella Zviagina

Marilyn & Sturges Bailey Distinguished Member Award

The Clay Minerals Society (CMS) is soliciting nominations for the Bailey Award. This highest honor of CMS is awarded solely for scientific eminence in clay mineralogy (in its broadest sense) as evidenced primarily by publication of outstanding original scientific research. Service to clay mineralogy, teaching, and administrative accomplishments are not considered. This award replaces CMS's Distinguished Member Award; hence, previous recipients of the Distinguished Member Award (see below) are ineligible.

Nominations for the Bailey Award consist of a cover letter and supporting letters outlining the candidate's qualifications in light of the criteria above. (Supporting letters may be solicited by the primary nominator.) Nomination material should be sent by February 1, 2000, to the committee chair: Stephen A. Boyd,

Dept. of Crop & Soil Sciences,
Michigan State University, East

Lansing, MI 48824 USA.
Telephone: 517-353-3993; fax:
517-355-3993;
boyds@pilot.msu.edu

Recommendations by the committee will be evaluated by the CMS Council, and the presentation of the Bailey Award will be made at the annual meeting of the Clay Minerals Society.

The first Bailey Distinguished Member will be Boris B. Zvyagin of the Russian Academy of Sciences, who will receive the award at the Y2K meeting in Chicago. The following list of people are already Distinguished Members and thus are not eligible for the award.

Recipients of the Distinguished Member Award

1968 — Ralph E. Grim	1988 — Max M. Mortland
1969 — Clarence S. Ross	1989 — Robert C. Reynolds, Jr.
1970 — Paul F. Kerr	1990 — Joe L. White
1971 — Walter D. Keller	1990 — John Hower
1972 — George W. Brindley	1991 — Joe B. Dixon
1975 — William F. Bradley	1992 — Philip F. Low
1975 — Sturges W. Bailey	1993 — Thomas J. Pinnavaia
1975 — Jose J. Fripiat	1995 — W. D. Johns
1977 — Marion L. Jackson	1996 — Victor A. Drits
1979 — Toshio Sudo	1997 — Udo Schwertmann
1980 — Haydn H. Murray	1998 — Brij L. Sawhney
1984 — C. Edmund Marshall	2000 — Boris B. Zvyagin
1985 — Charles E. Weaver	

CMS Student Research Grants

Purpose: The research program is designed to provide partial financial support of masters and doctoral research for graduate students of clay science and technology.

Selection: Applications will be judged on a competitive basis. The qualifications of the applicant, the financial need of the research project, and the design of the research project shall be considered. Applicants selected will be nominated by a five-member CMS committee and approved by the CMS Council. Members and nonmembers of the CMS are eligible. Students from all countries are eligible to apply.

Application: Each applicant must complete an application for research grant form (available from the CMS Office) and must obtain confidential evaluations from two faculty members at his or her university. Use the applicant appraisal form provided with the application.

Use of Funds: Individual grants will not exceed \$2,500. Grant money may be used only for the costs of travel by the grantee to conduct research, for room and board associated with research-related field work, or for the costs of equipment, supplies, and analyses required to complete the research, with the exception of up to \$500 for expenses incurred while presenting a paper at the CMS conference on thesis research. Recipients can apply for grants on subsequent years. Application forms and appraisals (7 copies) must be postmarked by April 1, 2000, and sent to the Society Office.

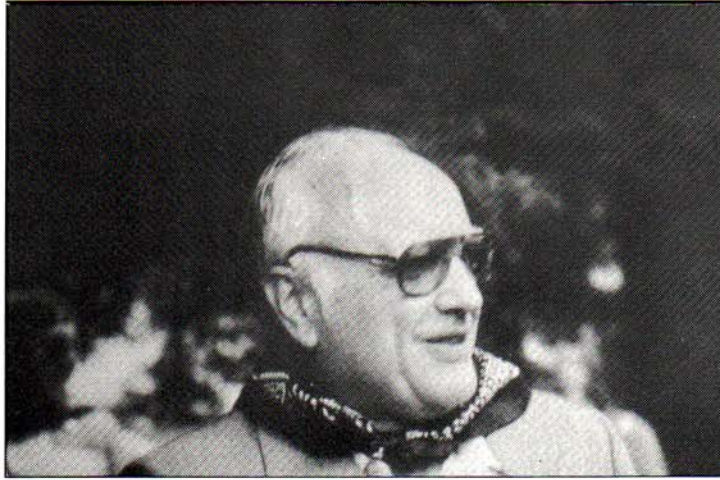
This information is also available at the CMS web site: <http://cms.lanl.gov>

W. Arthur White

1916-1998

For many of us, "Art" White's memory is the first thing we will think of when his name is mentioned. We will all miss Art's encyclopedic memory. When a reporter recently called from a Chicago newspaper wanting to know about "Chicago Common" bricks, we needed Art. This reporter wanted a picture or accurate description of the size and method of construction of the scove kilns used for making these bricks. We wanted the exact details of the firing cycle, including the unique trick of spraying them with water during cool-down. This made the bricks steel hard and kept them from crumbling after a few weeks due to rehydration in air. Not only would Art have provided all this information from memory, but he would have added a decade-by-decade history of the brick industry and several human-interest stories. On other occasions when a company or an individual wanted information for foundation work or for new clay resources, we would ask Art to stop by so we could pick through his marvelous memory. Art apparently had walked every stream valley, large and small, in the state, and he could describe the exact location of a paleosol in an outcrop that he had mostly visited 30-40 years before, and probably tell us the landowner's name to boot.

After his marvelous memory, the next thing that comes to mind when Art's name is mentioned is his unassuming demeanor. He presented himself as a common man, possessed an uncommonly inquiring mind, and a generous readiness to share the results of his inquisitiveness.



Chronology

Art White's 41-year career with the Illinois State Geological Survey began in 1938. Since his retirement in 1979, he had continued to be an active emeritus member of the Clay Minerals Unit until he died unexpectedly in his sleep on August 13, 1998. Shortly before his death, he had completed 60 years of service to the Illinois State Geological Survey.

Art worked part-time at the Survey to finance his way through the University of Illinois during the depression, earning his bachelor's in agriculture in 1940. After working for several chemical companies as a chemist, he returned full-time to the Survey in 1943 and continued his work toward advanced degrees. He earned his M.S. and Ph.D. degrees in geology from the University of Illinois in 1947 and 1955, respectively. Art was among the first students of Ralph Grim and William F. Bradley. He returned the favor of their mentoring by being a mentor for many of the geology students populating the Survey in those days.

From the early 1950s until his retirement in 1979, Art played a critical role in the training of many of the students and professionals who participated in the Illinois Survey's

and University's clay science program. For Randy Hughes, Neil O'Brien, Ed Odom, and Wally Parham, Art was the mentor who gave them the freedom to try new ideas and the continuing support to help them complete their graduate studies. Art used his skill in chemistry and soil testing to become one of the earliest of those we came to call engineer-

ing geologists and colloid geochemists. The latter remains a select club. Art gave these geologists the background that only a few other graduate students in our field have been lucky enough to receive. That the education of students, both in geology and allied fields such as engineering, soil science, and ceramics was important to Art, and recognized by others, is emphasized by the fact that he was appointed Professor in the Graduate College of the University of Illinois.

Career

Art began as an Assistant Geologist in 1943, was promoted to Associate Geologist in 1948, and to Geologist in 1955. He worked most of the time in the Survey's Clay Resources and Clay Technology Section, becoming head of that section in 1958. He remained Section Head until declines in Illinois' clay products industry led to the Section's closure in 1972. Art managed the Survey's particle size and engineering testing laboratory, helped several Illinois coal companies avoid under-clay squeezes and other roof and floor problems, and set up the Survey's ceramics laboratory. From

the 1950s-1970s, Art completed a one-of-a-kind study of the expansion and other kinds of changes that can occur in bricks made from a wide range of clays and shales. This research corrected many manufacturing and construction problems, and these solutions helped remediate damage at schools and other public buildings, and it eliminated these problems in newer construction.

The importance of Art White's contributions to the growth of the Survey should not be overlooked. Art's clay lab was always located in the middle of the first floor, so that important visitors from government and industry could walk in and see practical examples of how funding for the Geological Survey helped industries. Because ceramics require the almost contradictory mixing and careful firing of refractory and easily melted minerals, Art's contributions in this area were among his most valuable. This is especially so because the critical role of minerals, in these and other important theoretical and applied problems, seems increasingly to be forgotten, in academia, industry, and public service institutions.

Like Ralph Grim, Art was among the first to recognize that clay minerals were distinct mineral species, and Art, especially, recognized that chemical, mineralogical, and engineering measures of clays would provide much-needed quantitative controls and solutions for many geological problems. Because clay science developed on so many fronts, and because Art had such a rich background, he worked in a wide range of theoretical and applied areas. These included his groundbreaking work in the formation of syneresis structures in sediments, which still today are often misidentified as mud cracks or tectonic fractures. Often overlooked is the importance of Dr. White's work in the growth of the Illinois Survey and in the education of students, both in geology and allied fields such as engineering, soil science, and ceram-

ics. Art's clay lab was always located in the middle of the first floor, so that important visitors from government and industry could walk in and see practical examples of how our funding went to help industry, and from the middle 1960s onward, to address important environmental and "Geology for Planning" issues. His research on the effects of phosphate detergents and other pollutants in septic fields and similar settings were "firsts" in the new field of environmental geology. Art was among the first geologists to publicly comment on pollution and his views were reported in the local newspaper in 1968. Art simultaneously maintained a productive laboratory and managed to be out and about in the state. In addition to walking the creeks of Illinois in search of clay resources, he made periodic visits to clay mines and ceramics manufacturing plants. After his retirement, he established a highly successful, 15-year second career consulting primarily in the absorbent clay "kitty litter" industry in southern Illinois.

Art was a Fellow of the Geological Society of America, a founding member of Clay Minerals Society, a Fellow of the Mineralogical Society of America, a Fellow of the American Association for the Advancement of Science, and a life-long member of the American Ceramics Society, American Chemical Societies, Association Internationale Pour l'Étude des Argiles, and the Society of Economic Paleontologists and Mineralogists. He was a member of the Order of United Commercial Travelers Association, the University of Illinois Alumni Association, and Sigma Xi. He was recognized in *Who's Who in America*.

Combined personal and professional travel (with Alma)

Art was born in southeastern Illinois, at Sumner, on December 9, 1916. He is survived by Alma E.

Simonton-McCullough White, his wife of 57 years, and by his sister Leatha Johnson. He and Alma were usually to be seen in the audience for performances at the Krannert Center for the Performing Arts on the campus, and at many other cultural events. Alma shares many friends in our field, some made locally and some from accompanying Art on his many trips to national and international meetings, especially the International Clay Conferences. In 1969, they spent three months visiting clay deposits, clay processing plants, and clay mineralogy laboratories in Australia, New Zealand, and Japan. Art was given an ISGS leave of absence in 1970 to serve as a visiting professor at Universidade Federal do Rio Grande do Sul, in Porto Alegre, Brazil.

We will miss this gentle, unassuming man; we will miss him as a friend, as a colleague, and as a fountain of information.

*Randy Hughes and Dewey Moore
Illinois State Geological Survey
Champaign, Illinois*

Murray Chair of Applied Clay Mineralogy

At the Krakow meeting, friends of Haydn Murray met to celebrate his 75th birthday as well as their success in reaching the one million dollar goal for the endowed chair at Indiana University, which will be called the Murray Chair in Applied Clay Mineralogy.

Archives Thanks

Thanks for sets of back issues of the journal from **Fred Mumpton**, **M. G. Reed**, and **Charles Roth** (Philip Low's collection).

Thanks also to **Bob Hall**, for his archival contributions.

Interviews with the clay scientists

Jessica Elzea Kogel

Jessica Elzea Kogel, Vice President Elect of the CMS and long-time Chair of the Source Clays Committee, Chair of the Nominations Committee, is a researcher at Thiele Kaolin Company. The interview took place in Boulder in February 1999 and was conducted by Kathy Nagy, Jo Eberl, and Dennis Eberl.



CMS: What brings you to Boulder?

JEK: I'm attending the Society of Mining Engineers meeting in Denver, and I'm in Boulder for a couple of days to work with Denny.

CMS: And how much work did you get done?

JEK: Oh, we got a tremendous amount done!

CMS: What are you working on?

JEK: I'm interested in applying MudMaster to some of the Georgia kaolins. One of the problems with this interview is that there are some things I'm not going to be able to say a lot about because of proprietary information. But I can tell you that the reason thickness is important is because particle size and shape determine a lot of the properties of the kaolins used in the paper industry.

CMS: Everybody knows that. Is that a secret?

JEK: No, that's not a secret...

CMS: Probably those people down in Georgia just think that's a secret!

JEK: That's why I said it, because it's not a secret! But that's something we'd like to know more about and be able to measure better.

CMS: Are you interested in doing any AFM?

JEK: Yes, as a matter of fact I wanted to talk to you about that because we've been wanting to do AFM, and I have a series of samples I've brought out that Denny's

already looked at once before. They're some of our products, and we did TEM thickness measurements on them. I also wanted to do AFM measurements on thickness, but so far haven't been able to find someone who knows AFM and also knows how to work with clays. If that's something you're interested in...

CMS: Could you provide any funding for a student?

JEK: Yes, I think we could.

CMS: Okay... This interview's getting somewhere.

JEK: We like to fund work at universities when we can because we often don't have the time and staff to do it in-house. It would be a good project, comparing measurements by TEM and AFM. It's more interesting than it sounds at first.

CMS: Patricia Maurice and her student Qunhui Zhou tried to study kaolin particle thickness with AFM, and it turned out to be not that easy to do.

CMS: I think it's also very more time-consuming than anything.

JEK: Yes, making sure you measure enough particles, the same thing you run into with TEM. We also have laser diffraction data on these samples, and software that allows us to calculate aspect ratio from the particle size distribution. We want to know if that number is meaningful at all. That's one of the reasons we've gotten into thickness. It all gets back to how can we better understand particle shape, measure it routinely, and then start correlating that with some of the properties we think it controls in our products.

CMS: Those manufacturers of particle size equipment might well be careful, because probably their answers are nonsense compared with what's really there.

JEK: Yes, and we're seeing sort of mixed results. We get fairly good results with certain types of clays—mostly products that have a very predictable particle size distribution, but a lot of clays have multi-modal particle size distributions and they make assumptions that just aren't valid in how they do their calculations based on that distribution.

CMS: We had some calcites measured by Coulter counter, and then measured them by microscope, and the Coulter counter measurements were off by an order of magnitude. You know, you trust the microscope measurements, but...

JEK: And we found the same with ours. The laser diffraction unit that we're using was off by an order of magnitude.

CMS: Are you giving a talk at the meeting?

JEK: No, I'm second author on a paper on a process we recently patented for removing goethite from kaolins. Goethite is ubiquitous in our kaolins, and a lot of our processing has to do with removing impurities. We use a reductive leaching process that works very well on hematite but not as well on goethite, which isn't as soluble. We don't optimize the process for removing the goethite, so a lot of times we'll go through this reductive bleaching process to improve one aspect of the color but not the other, which is the yellowness. For our products, yellow is not good.

CMS: Can you use magnetic separation?

JEK: Some, but we developed a process where we actually thermally treat the clay to convert the goethite to hematite and then apply the standard reductive leaching and the magnetic separation steps. This works because hematite is more responsive to magnetic separation and reductive leaching. My co-author is giving the paper, and I'm program chair, so I'm tied up with that, and I'm also incoming secretary-treasurer, which means I have to do my secretarial duties and so on.

CMS: Are you in line to become president?

JEK: It's actually chair of the division. I think the society is about 6000 people, and it's divided into divisions. The industrial minerals division has about 900 people. And in 2002 I'll work my way up the ladder and become chair of that division. Most of my time at this meeting is directed towards official duties and less towards technical things.

CMS: How did you get into clay mineralogy?

JEK: When I was an undergraduate at Berkeley, I took a petrology course with Dick Hay, and in that class he really emphasized alteration products, especially of volcanics, which is what he was really interested in, and that was where I first got into the idea of clays. I took a couple of classes from him. By the time I graduated, I was interested in sedimentology, low-temperature geochemistry, that sort of thing, so I started looking for graduate programs which were strong in soft rock. I applied to Arizona, Wisconsin, and Indiana. I ended up at Indiana because they gave me the best funding. I had also gone to Indiana's field camp in the Tobacco Root Mountains near White Hall. I didn't go to Berkeley's field camp because most of the geology I knew about was California geology. I wanted to learn something new, and I also wanted to meet people who were at other programs and get another view of the world; so I applied to Illinois' field camp, and Indiana's and a couple of other big ones with good reputations. So that's one of the main reasons I applied to Indiana for graduate school because I had been impressed with their field camp.

CMS: There's a great hot springs in White Hall. Have you been there?

JEK: I don't think so.

CMS: We went there. You go to a local bar and buy a six-pack and they give you a key, and you go out, and it's a naked hot springs. The springs are so hot, you have to drink the beer really fast to stay cool enough to stay in it.

I ended up with Haydn, who gave me a really interesting project and has been my mentor.

JEK: They must have tried to hide that from us. Maybe they didn't want 80 of us there. To make a long story short, I ended up in Indiana, did a master's first with Enrique Merino modeling red-bed copper deposits. Then I got to know Haydn Murray who was head of the department. He was one of those people that all the students in the department looked up to. I ended up with Haydn, who gave me a really interesting project and has been my mentor.

CMS: I like Haydn a lot. He is so interested in and helpful to people.

JEK: He really is. He had the largest group of graduate

students and a well-equipped lab. Everybody was involved in consulting—that's how he funded his lab. I'd taken clay mineralogy from him and John Droste, and really enjoyed the class. Clays were a real natural for me. They fit with my interests, and I'd already been doing a lot of work with them anyway. Once I was officially his Ph.D. student, there were nine of us and two or three post-docs. So it was a packed lab.

CMS: He took after Grim.

JEK: Very much so. It was really kind of the center of things at Indiana. I started working in the lab, and I really enjoyed the consulting and learning about the applications of clays. That's when I first got interested in why different clays are suited for different types of applications—really a very Grim sort of thing. I did my dissertation on Wyoming bentonite. I looked at the Clay Spur bentonite from a lot of different perspectives, the geochemistry, oxygen isotopes, trace element chemistry. I was interested in understanding the alteration of the deposits and why all these very pure high-quality sodium bentonite deposits are there. So I spent two summers sampling in the Powder River Basin and Bighorn Basin—loved my field area—did some stratigraphy and so on.

CMS: Is that volcanic ash that fell into a lake?

JEK: Yes, into the Mowry Sea.

I realized that almost all bentonites had either opal C or opal CT that had been misidentified cristobalite.

CMS: And it altered under sea conditions?

JEK: The Mowry was an inland seaway, and towards its margins it was brackish. You can actually see distinct chemical fingerprints in the clay deposited in each of these environments. That's why I collected samples across the Powder River and the Bighorn Basins from the shore into the center of the ancient Mowry and looked at trace element chemistry. I also included the more applied aspects of bentonites and worked that in because there are different qualities of bentonite related to weathering, so I got into what was happening due to oxidation of the iron. Weathering changes the properties that are really most sought-after for drilling muds. I did a lot of SEM and characterization. That's also how I first got interested in opal. And I've continued working in opal, especially in bentonites and altered volcanics.

CMS: Why is opal important?

JEK: The reason it was important when I first got into it was because when you X-ray Wyoming bentonites, you get what everyone had mistakenly been calling a cristobalite peak. The reason that was significant is because the whole crystalline silica issue had recently come up. In the mid-80's when IARC had determined crystalline silica a possible human carcinogen, they defined crystalline silica as quartz, cristobalite, and tridymite. Sodium bentonite manufacturers were suddenly having to look at their clays, and if they found cristobalite, they had to label their clays a possible human carcinogen. So I started looking really hard at this supposed cristobalite, and I just assumed, as everyone had, that it was from the parent ash, that it was actual true high-temperature cristobalite. I started doing a lot of SEM on different size fractions and getting down on my hands and knees looking for volcanic cristobalite and never found it.

And then finally one day I started looking at the smectite and started seeing these rims along the edges of the smectite particles, and the rims were very thin. When I first looked at them by SEM, I didn't really have the resolution to go in and do a good chemical analysis. That was the only thing I found, and I thought, well, this has got to be it. I kept looking at them and trying to come up with a way to prove that this was in fact cristobalite, and I was also thinking it can't be cristobalite, it's got to be opal because it can't be a high-temperature phase. Next I looked more carefully at the X-ray diffraction patterns of the opals, opal C, opal CT, and started doing more careful X-ray work on the bentonites. I realized that almost all bentonites had either opal C or opal CT that had been misidentified cristobalite. If you look at peak width and peak position, they are very close to cristobalite and tridymite, but they weren't those things. Then I developed... Are you playing footsie with me?

CMS: I'll take over the interview from here. What was your first job after you finished your Ph.D.?

JEK: I had always thought that I would teach, and when I finished, I was ready for a different environment. It was also the time that everybody else was looking for teaching positions. I decided I just wasn't going to look. I actually had several jobs that came to me, and one of them was McCrone through some of this crystalline-silica work I had done. They wanted to bring in someone who knew clays and industrial minerals. They do micro-analysis and they have a lot of geologists on staff, but they really wanted to make a concerted effort towards providing this kind of analysis for industrial minerals companies, so that's how I ended up there. I stayed there for almost three years. The first year it was challenging. I was enjoying

learning X-ray diffraction inside and out, but I realized I was not doing clay mineralogy, and I really did not enjoy consulting. I didn't get to do any real problem-solving because a lot of these companies that I consulted for did not want to give up much information. They're not going to bring you in as a problem solver. They're going to say will you run an x-ray pattern for me and send it to me. You don't really get involved in the interesting stuff, which is what I was hoping for. I did have a few projects like that, but they were few and far between. Mostly what I was doing was quantifying the amount of quartz in talc or something.

CMS: Did you think it was accurate?

JEK: It depended on what I was looking at.

Your confidence diminishes, but X-ray diffraction is the best method there is and you're kind of stuck with it and have to do the best you can with that particular tool. The job at Thiele became available, and I wanted to get into the clay industry. When I completed my dissertation, I had wanted to work for a bentonite company, but that was about the time the oil industry downturned, and that really affects bentonite. There really weren't a lot of opportunities there, but there are a lot of opportunities in the kaolin industry, and better ones because the kaolin industry has a much more highly evolved research and development effort.

CMS: Why? You would think that everything there is to know about kaolin was known. Why are they so interested in research?

The Middle Georgia clays, the really good quality clays, we have less than 20 years.

JEK: Our company is interested in research because Mr. Thiele really feels it's the future of the company. We have lots of competition both from other companies in the US and from the Brazilian clays, and one of the only ways for us to maintain our position is to emphasize research and development and learn how to utilize our deposits through new product development and improved processing. We have vast reserves of the KGa-2 type clays, which aren't the ones the industry was originally based on. He understands that in order for us to be a company that stays for the long term, we have to be able to use the KGa-2 type reserves. We've also got to learn to use the non-commercial grade Middle Georgia crude, the KGa-1 type clays.



Bob Kogel, Matthew, and Jessica Elzea Kogel in Boulder, 1995. Jo Ebert

CMS: Are those the poorer quality ones?

JEK: No, not necessarily poorer, just different.

Originally when we started mining in Georgia, most of the clay was sold for paper coating, and processing, the product specifications, everything was based on the crude from Middle Georgia. Later we started mining the clay from East Georgia. They really are very different types of clays. But we're going to run out of the Middle Georgia clays, so we've got to learn how to take the East Georgia Tertiary clays, the KGa-2 type clays, and substitute them.

CMS: How far in the future do we have a supply of Georgia clays?

JEK: I don't know. If you look at the Middle Georgia clays, like the KGa1- type clays, the well-ordered kaolin-ites, those we have a much shorter supply of because those are the ones that have been mined the longest. You hear different numbers, and different for each company because each company has different reserves, but the number I hear thrown around the most is 20 or 30 years. As far as the East Georgia reserves, it's around 100 years. The Middle Georgia clays, the really good quality clays, we have less than 20 years. We've really used most of those.

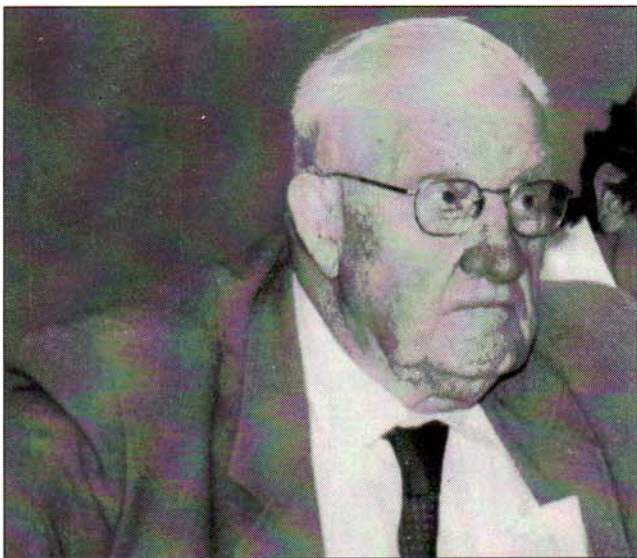
CMS: What makes them good quality?

JEK: Well, when I think of good quality, and I'm speaking specifically for paper-coating, in the broadest terms it's clay that's white, high in brightness, and with very good high and low sheer rheology. All that comes back to a fairly pure kaolin, one that's mostly kaolinite, which doesn't have a lot of iron oxides that cause discoloration, and no smectite which can cause problems with rheology.

There are a lot of kaolin deposits in Georgia, but I've heard that only two per cent of the deposits are the really good quality stuff. We have lots of different pressures on us now, but the only way to stay viable as a company is to put a lot into research, and Thiele does. It's basic research. We do product development and process development, but we also do research that is aimed at really understanding these deposits and understanding how we can use the intrinsic properties of the clay to make better products.

CMS: What are kaolins used for?

JEK: They're used for paper coating, ceramics—porcelain, sanitaryware, dinnerware—as a filler in plastics, fiberglass, rubber, paper.



Walter Keller, a patient of Jessica Elzea's grandfather.

High Iron Photos

CMS: What do you mean by filler?

JEK: In paper, for instance, paper is made of pulp, cellulose fibers. If you don't have something in between those fibers, you can't print on that paper.

CMS: So the type of kaolinite you'd use for a filler would be different from the type you'd use for coating?

JEK: Yes. It's a different quality, and in rubber and plastic and fiberglass, it's an inert material that's added to give strength and other properties. It's inexpensive. We say it's inert, but we know it's not really. That's sort of a simplification.

CMS: It's not inert if it gives it strength.

JEK: I'm saying chemically inert.

CMS: What about cosmetics?

JEK: It's used in cosmetics, but I don't know too much about that. That's something we're not involved in at all. It's used in paint to keep the paint from dripping off the ceiling, for example. It used to be in Kaopectate, but now I think they use attapulgate.

CMS: What about Dairy Queen milkshakes?

JEK: I have heard that!

CMS: Is that smectite?

JEK: I've heard Hershey bars.

CMS: The famous thing is that Dave Pevear, when he was a student at Montana, X-rayed a Hershey bar and got a montmorillonite peak, he claims. Everyone's been spreading that rumor ever since.

CMS: Is there a lot of competition in the kaolin industry, and do you think it's healthy?

JEK: I've been there for seven years, and I've seen some big changes. There's a lot of competition in the US market. I think it all started when Georgia Kaolin broke up and was split up into DBK and ECC. Just recently ECC has been bought by Imetal, which owns DBK, and now they're back together. DBK bought Nord last year. It's not finalized. The Justice Department has to go in and do their investigation. I think it's interesting that the Justice Department made DBK and ECC spin DBK off, and now they're all back together again. I'm interested to see what happens.

So there's a lot of competition in the marketplace, a lot of mergers, there's the Brazilian clay, that's a very high quality clay that's coming into Europe and Asia now and will eventually be hitting the US market more heavily, and as a result the companies are less willing to share information. I see that in the past scientists at companies like Georgia Kaolin would publish in *Clays and Clay Minerals*, and there was a lot of information out there. Now we can't really do that. The companies investing in their intellectual properties don't want to give it away to their competitors. I worry about it because if we're going to compete with the Brazilian companies, we all need to pull together because those companies are all working together.

CMS: Oh, they are? They're not competitive with each other?

JEK: They are, but they still work together because that's the only way they can compete against us.

CMS: What are you going to do in Denver that's not business?

JEK: Go hiking tomorrow. Today Jo and I had lunch. I might do some cross-country skiing when my husband comes. Going to go to a movie set. I've been to the *Will Rogers Follies* and to a play called *Two Women Avoiding Involuntary Hospitalization*. I'm going to eat good food, enjoy the mountains, do as many cultural things as possible.



Jessica Elzea, Juanita Murray, and Jean Hemzacek Laukant, 1996.

Jo Eberl

CMS: Good food?! This morning I had Eggs Benedict and you had granola!

JEK: I can't get granola in Georgia. Granola is like wow!

CMS: So what do people in Sandersville think of exotic people from Nepal coming to their town? Or exotic-looking women like you?

JEK: I was actually worried about that when I moved there because they hired me into a management position. It's a very traditional society, and women tend to stay at home. There were other women in management there, but none of them had come in with a Ph.D. They were in more traditional management, like in accounting and that sort of thing. I have not ever had a problem.

CMS: Probably the Northern view of the South isn't right.

I'm the black sheep of the family in that I'm the only one who went into the sciences. They're artists.

JEK: It's not. There are a lot of stereotypes that are of course perpetuated by television and the movies. There's truth in all those things, but that's just one aspect of it. I've really enjoyed the people I've worked with. They've been very accepting of me. I feel that I've been brought into the Thiele family. It's a very nurturing, caring environment, and they're very accepting of different people. They're not threatened by it. Sandersville's an interesting

community. There are people from all over the world who come in and work in the kaolin industry, and all of them have Ph.D.'s.

CMS: Sandersville has the highest number of zip codes in the CMS.

JEK: Oh, does it really?! As far as a person in clay mineralogy, it's been a fantastic place to be because there's so many of us in Georgia. It's a really stimulating environment. There's the University of Georgia with Vernon Hurst and Paul Schroeder, Crawford Elliott at Georgia State, and Chuck Weaver at Georgia Tech, Bob Pruett and Jean Yuan at ECC, and my colleagues at Thiele including Chip Malcolm, ZZ Zhang, and Prakash Malla, as well as many others. There's also Sam Pickering. So there's a lot of us, and we can interact. It's a good place for me to be. And I'm finding out that kaolinite is much more interesting than I had thought it would be. Maybe my favorite clay.

CMS: It's my favorite clay, too.

CMS: You, too? Oh, no!

CMS: How did the people in Sandersville come down on the Monica Lewinsky thing?

JEK: In the South, we have this unspoken rule. We don't talk about politics. It's a very non-confrontational, very gentlemanly sort of society there.

CMS: I can tell that by the way Newt Gingrich behaves. What's his favorite clay?

JEK: He's from Atlanta. That's a completely different ball game. One day we were interviewing somebody, and this guy had just moved back from Saudi Arabia where he'd been for about seven years. There were about eight of us having lunch, and I asked, "So, what does everybody in Saudi Arabia think about the Monica Lewinsky thing?" And it was kind of fun because I could ask him the question, and it got everybody into the conversation.

I think everybody had the same feelings about it. Nobody condoned what Clinton had done, but they thought what Ken Starr was doing was much worse, and didn't like the fact that we were being dragged through all this. Everybody sort of said they were fed up with it. But it was interesting hearing what the Saudis thought about it. In their society, it's not unusual to have more than one wife. So to them, it was like why is everyone making such a stink about this? Which is I guess how it is in many places outside of the United States.



Celebrating Haydn Murray's 75th birthday in Krakow: front to back, left side: Bob Pruett, Fernanda Cravero, Karan Keith, Roland, Merkl, Eduardo Dominguez; front to back, right side: Jessica Elzea, Haydn Murray, Allegra Yeley (Jessica's daughter), Colin Harvey, Gary Beall.

Courtesy J. Elzea

CMS: On the other hand, if someone steals something, they cut off their hand.

JEK: Well, yeah. We didn't get into that.

CMS: I think in France it's illegal to ask someone in a court of law if they're having an affair.

JEK: Really. Illegal?

CMS: Who knows? Someone told me that. Anyway, you come from an interesting family. Why don't you tell us about that?

JEK: I'm the black sheep of the family in that I'm the only one who went into the sciences. They're artists. My parents are painters, and my brother's a film-maker in Vienna. I'm the only one who went into science, but I think I've got a creative side, and science is my creative outlet. My father was the curator of the Delaware Art Museum in Wilmington.

CMS: That's why you lived up the road from me. I was there from 1968 to 1977.

JEK: I was born in New York City. We moved to Delaware six months later.

CMS: How'd you like Delaware compared to New York?

JEK: We had very close ties to New York and spent a lot of time there all the time I was growing up. We moved to Delaware in 1959 and left there in 1975, so we were there at the same time. When I go back, I go back to Newark, Delaware, because that's where most of my childhood friends are now, and so is my sister. We moved to New Haven because my stepfather was dean of the art school at Yale. I finished up my high school years in New Haven. My parents stayed there until seven years ago, and they now live in Washington Depot, Connecticut.

CMS: What's your British connection?

JEK: This is really complicated. My mother and father had three children. I'm the eldest. My parents divorced when I was 13. My mother had been going to England to teach at Reading every year, and she met my stepfather there, who had also been married. And it's been a wonderful thing because my stepfather is a really, really important person to me, and I can't imagine life without him. Or my mother not having him. My father meanwhile, through the museum, met my stepmother, who is from England. So my stepmother moved here, and my mother and stepfather moved to New Haven instead of England so she could be closer to us kids. When my father retired, he and my stepmother went back to England, and they bought a cottage near Canterbury that happens to be three miles from the family home of my stepfather, where my stepsister still lives. We're a very close family. After my parents got divorced, we often had our Christmases together—everybody. Even my stepmother's ex-husband would be there! So I carried on the tradition. My husband and I have three children—his,

mine, and ours. We were both previously married. His is Daniel, who's eleven, mine is Allegra, who's ten, and ours is Matthew, who is four.

CMS: Did you have any teachers in school who got you interested in science?

JEK: Yes, I did. I had a fifth grade teacher who did. I was interested in a lot of things growing up. Through my parents, I was interested in art, architecture, archaeology. I had a lot of interests, but my parents couldn't really introduce me to science. We had a close family friend who was a research scientist at Dupont, so he helped with science fairs and things, but really it was the teacher.

CMS: What did he do that got you interested?

JEK: I think it was the way he talked about it. He was excited about science and tried to give his students that same sense of enthusiasm, and he would also reward them for their accomplishments. I did well at it, so I gained a lot of satisfaction and self-confidence in it.

CMS: Is there any one episode you remember about discovering science?

JEK: Early on, I realized I was very interested in the natural world—bird-watching and all that sort of thing. Until I went to college, I hadn't made the choice. On the other side, I had always been interested in writing and photography, so I had two very different choices. I made the decision that science is what I wanted to study in college because I couldn't do it on my own, whereas writing and photography I could do on my own. So the first step was that decision. But what really turned me on to it was my first geology class as an undergrad.

CMS: Who did you take it from?

JEK: I started out at Smith College...

CMS: John Brady?

JEK: John Brady was on sabbatical that year, and I took it from Bob Burger. I was only there for two years and then transferred to Berkeley. When I found geology, it was kind of an ah ha! thing for me. I discovered it freshman year, first semester.

CMS: When did you first join the Clay Minerals Society?

JEK: 1985.

CMS: Wow! How did you know that?

JEK: Oh, here's an interesting story. Socorro was the first meeting I went to, in 1987. I met Walt Keller there. I very much wanted to meet him, not just because of who he is in the clay world, but for many years my grandfather had been telling me about this geologist he knew at the University of Missouri. My grandfather was a dentist in Columbia, and one of his patients was Walt Keller. When I first got into geology, years and years and years ago, he said, "Oh, I've got to introduce you to my friend." Walt would come over to get his teeth cleaned and bring his journals, and my grandfather published in the dental journals, and they would look at each other's papers. But I didn't know who he was until I got to Socorro and put two and two together. He was a couple of years older than Walt; he just died two years ago when he was 101.

CMS: Walt's going to turn 100 next year.

JEK: Every time I see him now, he comes up to me and says, "That's right, you're Dr. Elzea's granddaughter." It's kind of an interesting connection.

CMS: How was he? When did you see him? Was he just walking around the department?

JEK: Yes, I was visiting Bill Johns, and he and Keller used to have adjoining offices. He still has an office there.

We live right where Sherman marched on his way to the sea.

CMS: I thought they cleaned it all out.

JEK: They were doing it while I was there. It was amazing all the stuff he had on his walls, fascinating, pictures of him with different people back fifty years ago, awards. The time I was there, he was going through his collection, and he transferred it to Haydn Murray. He's really amazing. He and Haydn stay in close touch.

CMS: He sends me stuff all the time, notes, articles, a lot of questions for the clay doctor.

CMS: Have you won any big awards lately?

CMS: Yes, she's getting one next week.

JEK: The Robert Pierkarz Award. It's not a big award. This is one they give everybody who's a program chair, for being there and working hard. I did get the Young Scientist Award from them several years ago.

CMS: What do you like to do in your spare time?

JEK: I have no spare time. But when I do, I like to go backpacking, canoeing, hiking, and so on, and going to the Art Institute in Chicago which I dearly miss, and reading the New York Times, reading in general. We like to travel, so whenever we can, we do. This year we're going for two weeks to Palau, which is a little island in Micronesia, scuba diving and kayaking and whatever else we find to do there. I really like to get to other parts of the world that I haven't seen. My other hobby lately has been yoga.

CMS: Are you going to Krakow?

JEK: Yes, and I'm going to take my daughter and visit my brother in Vienna. We may go to Norway, too.

CMS: What's the last book you read?

JEK: I just read the *Postcaptain* by Patrick O'Brian. There's this whole controversy over how he writes books similar to that other sea guy, Horatio Hornblower. There's one group who says this series is just a bad copy of Horatio Hornblower, and the other group who says this



Serious interviewers Kathy Nagy and Jo Eberl. Dave Pevear

series is for the intellectuals, but I loved it. I really like historical novels, biography, autobiography, and of course, novel novels.

CMS: How about the Ya Ya Sisterhood books?

JEK: No, I haven't read those.

CMS: I really like those. And Ellen Gilchrist. She's a wild Southern woman, and so are the Ya Ya Sisterhood

women.

JEK: I love Southern writers. I've started reading Faulkner again since I've lived in the South, and Flannery O'Connor...

CMS: Have you read *A Confederacy of Dunces*?

JEK: No.

CMS: Oh, you should. It's funny. It was published after the author died because the mother found the manuscript. It takes place in New Orleans.

CMS: What's interesting to me is that the stereotype of the South is very staid and proper and conservative, and yet all these Southern writers—the people are so wild, the women are so wild. Is that how it is? Are the women in Sandersville all running around getting drunk and doing all these things?

JEK: It's an interesting society that way. It reminds me of the British. They love their eccentrics. I love Bailey White, you know, on NPR? I know people like that, wonderful characters.

CMS: I wonder if there's something about the South that brings that out in people, or if that's the only interesting thing that happens down there, so Southern writers always write about those people.

JEK: The families, the weather, the history, the war, families that settled there and never left. There are people I work with whose ancestors settled land grants from King James and that same family still lives on the same land. It's very different that way. It's not mobile, kind of clannish, not with a negative connotation. Because of that, there's a very strong oral tradition that you don't get in other parts of the country, and I think that comes out in the writing. And a lot of it's oral history about people's families, and there are people who talk about the Civil War as if it happened yesterday. And it's not the Civil War there; it's the War of Northern Aggression. At first when I heard that, I didn't have any idea what they were talking about. We live right where Sherman marched on his way to the sea. To me "Yankee" is not a derogatory term, but it is definitely there. They let me know.

CMS: They let you know?

JEK: Oh, yeah. When I first joined Thiele, I went through an orientation, where I visited the mines and met a lot of different people at the plant. I remember one guy asked, "Where were you born." They don't care where

you were from. What matters is where you were born. I said New York City, and that was the end of that conversation. And that's often what they'll ask.

CMS: What kind of writing do you do?

JEK: I don't do any now, but what I used to write and like to write is fiction, short stories. I'd love to write a novel, and actually started something a couple of years ago that I work on a little bit here and there. At one time I was interested in writing poetry, but I've never pursued that. But once I got into science, I turned away from it, and my writing now is aimed towards scientific and technical writing. With children on top of everything else, I just don't have the time. A lot more of that energy is turned towards my kids and helping them develop. My daughter writes poetry, and I'm working a lot with her, so I do have an outlet there. And it's really neat seeing her poetry come along. She writes some great stuff. But I fully expect to get back to it later in life. At times I'm frustrated that I don't have that creative outlet.

CMS: Science tends to be confining.

JEK: It can be, but in other ways, I find that I need that to be creative. If I were totally left on my own, I might be paralyzed by choices. There are rules. I like finding creative solutions within defined parameters. I like that challenge, and I feel very comfortable with it.

I like finding creative solutions within defined parameters.

CMS: I heard Robert Frost give a talk where he said that by sticking to certain forms in poetry, it brought out creativity rather than restricting it. I often think of that in science.

JEK: I can definitely see that. It allows you not to worry about certain things. I'm interested in the creative aspects of science. If I weren't, I guess I would have been an engineer. Geology gives you a lot of room for problem-solving and putting ideas together in different ways, and I really like that whole process, taking information from different sources and putting it together.

CMS: I heard that during World War II geologists were



Jessica Elzea and Kathy Nagy, in Boulder, 1999.

Dennis Eberl

used to look for enemy submarines because they were trained to put a lot together on a tenuous bunch of data. Chemists weren't very good at that.

JEK: Yeah, they're not comfortable doing that. But geologists...

CMS: Like to make up stories.

JEK: Exactly!

CMS: You should write a story for the newsletter.

JEK: Didn't I do something for it once?

CMS: Yes, you wrote the Thiele profile.

JEK: That was fun. I got to interview Mr. Thiele for that, and I really enjoyed that.

CMS: He's still active in the company?

JEK: He is. He comes in every day, and as the years go on, he's less and less directly involved, but he's still very much a presence.

CMS: Getting back to writing fiction, you could write a short story for the newsletter with a clay mineralogist as the hero.

CMS: Yes, he could study the theology of the clay-water interface.

JEK: Hmm...

Ask the Clay Doctor

(Not a real doctor)

Dear Clay Doctor: I'm thinking about writing an article on smectites. What is the appropriate inter-sentence spacing to use for the text? Should I change the spacing to double space, or will heating the manuscript to 475 degrees F to ensure that it will be collapsed be sufficient?

Carl in Madison... or is it Boulder?

Dear Carl: Dr. Clay is out to lunch, and smectites are not my speciality. I suggest that you write the Sultan of Smectite about the interlayer/intersentence spacing problem. Yes, heating manuscripts to their ignition temperature always is helpful.

Sincerely, The Emperor of Illite

Dear Clay Doctor: I want to have an affair with a clay mineralogist. Is this a good idea?

Drooling in Timbuktu

Dear Drooling: It depends on whether you want to be dragged through the mud.

Dear Clay Doctor: When I was a student in an underfunded and little-known state institution in the Midwest I was taught to prepare clay materials for X-ray analysis by first placing the sample in a large, flat-bottomed iron kettle and then pounding the bejeebies out of it with a nine pound sledge hammer. Following that we added a couple of pints of concentrated HCl to remove carbonates, then filtered the mixture through strips of used bed sheets. The filtered clay was then combined with local river water to get a suitable suspension prior to conducting high-resolution X-ray and geochemical analyses. My career flourished and, as I am sure you well know, I became internationally famous for my work with clays. I even won one of those big prizes they are always talking about, but that's another story. Anyway, now one of my students has had the temerity, nay the audacity, to chastise me for my so-called unorthodox methods of sample prep, claiming that the clay structures are irreparably damaged by these treatments. Would you kindly set the neophyte straight by explaining that my life's work has, in fact, been built on solid, reputable scientific procedure?

Anonymous in Alhambra

Oh, My Dear Anonymous: Say it ain't so. Oh, do tell me this is all some wicked nightmare from which I shall momentarily awake. For if I am to believe in truth what

you have told me then I must confirm the correctness of your student's opinion. Can you, dear sir/madam, but imagine the destruction, the devastation, the absolute chaos which you have brought upon these dear little platelets by your harsh and savage methods? Why, after such treatment you would have apical oxygens detached from their octahedral sites and pointing in all possible directions looking like so many tiny hedgehogs scurrying about in the moonlight. And the loss of OH's would be incalculable. No, no, a thousand times no. You must handle them gently; with soft leather gloves if possible, and certainly to the accompanying themes of a Haydn string quartet or, at the very least, a gospel trio in the background gently singing, "so fine, so fine." I fear, dear Anonymous, that you must start your career anew.

Dear Clay Doctor: How in the heck did I get on this alias list? I find geology fascinating when I'm digging holes in my back yard for fence posts. Other than that I sell computers. Anybody need a kick-butt Unix data base server? If so, send me an e-mail. If not, please take me off your list. Sometimes the info in your group seems a bit sensitive. I'd rather not be privy to such communication.

Listserver Mistake, Ethernet

Dear Mistake: Talk about sensitive info! Please, keep discussions about privies and butts in the backyard where they belong.

Dear Clay Doctor: My husband and some other clay mineralogists have been making damn fools of themselves. What should I do?

Sensible, Southwest

Dear Sensible: You've got the wrong column. You need "Ask the Civil Engineer and Department of Public Works Doctor."

Dear Clay Doctor: What are your hopes for the new millennium?

Need some encouraging words, Home on the Range

Dear Encouraging: Lattice have peace.

*Student Profile***Alba Y. Corral-Avitia****What is your nationality? Where are you from?**

I am Mexican, from Chihuahua, Mexico.

What is your place of study?

I got my undergraduate degree at the Universidad Autonoma de Chihuahua, and currently I am doing my graduate studies at New Mexico State University in Las Cruces, NM.

Who is your thesis advisor?

I am under the supervision of Dr. Antonio S. Lara.

Thesis topic: Selective Catalytic Reduction of NO_x using Layered Clays.

Air pollution is a global problem that needs immediate attention. I am specifically interested in Nitrogen oxides (NO_x) which play a significant role in air pollution. NO_x are responsible for the production of acid rain, tropospheric ozone, and respiratory diseases. My optimal goal is to contribute to the abatement of NO_x emissions of power plants. Selective catalytic reduction (SCR) is a state-of-the-art technique used in power plants. SCR uses a catalyst and a reducing agent at relatively low temperatures to chemically reduce NO. The cost and durability of the commercially available catalyst have opened a tunnel, and finding an optimal catalyst to be used in SCR is still a challenge. Since layered clays have not received much attention, I decided to explore that area.

Why are you interested in clay?

Because clays are natural and abundant materials with the appropriate physico-chemical characteristics that can be used as they are or be properly modified to try to solve environmental problems. Copper exchanged lay-



Alba Y. Corral-Avitia at a CMS meeting with then-Editor-in-Chief Wayne Hudnall.

ered clays have shown potential on the reduction of NO_x using ammonia as a reducing agent.

What are your other interests?

I am interested in finding new technologies to solve environmental problems with a minimum cost. I want to graduate and go back to Mexico. My expectations are to be able to continue in this research area. I am also interested in helping homeless children.

Do you have a favorite book, poem, music, artist, and/or quotation you'd be willing to mention?

My favorite book is *Juan Salvador Gaviota* by Richard Bach. I like the poems of Garcia Marquez and Octavio Paz. I do not have any preference for the music because I like all kinds. Artists: Hmmm..... Lucero (singer), Sebastian (sculptor) among others. I like to dance to all kinds of music, mainly the Mexican folklore.

Are there any other issues of particular interest to you?

My bachelor's degree is in Chemical Engineering in Agro-Industries, and before I came to the USA, I had a

great interest in building a micro-industry with the elaboration of a new product. This dream still is part of my plans.

I would like to thank the CMS for their support with the student research grant. It helped me to open up new connections with El Paso Electric (power plant) and Waste-management Education and Research Consortium (WERC) at New Mexico State University. With their contribution, I have been able to produce exciting research results.

What is your favorite clay?

I am working with natural clays (not identified yet) of this region. Preliminary tests have shown that they also have potential for the reduction of NO_x. What is more interesting is that these clays do not require any chemical modification for their use in SCR. My favorite clays are those that have not been tested before.

Happy 100th, Walter!

In Dublin's Fair City

The Spring 1999 meeting of the Clay Minerals Group was held at Trinity College Dublin on 25th March in the marbled splendour of the Geological Museum, first opened in 1857. Trinity College has one of the oldest established geology departments in the world, dating back to 1843, and has become Ireland's centre for clay mineral research, particularly in relation to basin maturity studies. This was the Group's second meeting of the 1990's to be held in Trinity College, reflecting the active membership of The Mineralogical Society in Ireland.

The convenor, David Doff, arranged a varied programme which ranged from fundamental particles to medieval bricks, and included two presentations on the effects of dyke intrusions on clay minerals in adjacent country rocks. One study report-



David Doff and Derek Bain.

Karuna Eberl

sand, global warming will probably get the blame—if it is still the focus of fashionable angst.

The Invited Guest Lecture by

thickness by a modified version of the Bertaut-Warren-Averbach technique. In his lecture and a lunchtime demonstration, Denny showed how MudMaster could measure clay crystallite size distribution (CSD), and how well these CSDs correlated with NEWMOD calculated patterns and TEM data. It looks like the Kübler index might have to move over but, like the dissolution of a saponite-cemented building stone, it takes time and angst.

Denny's most startling revelation resurrected the association of clays with the origin of life. Depending on their maturity, a clay CSD can be tutored to write its own life history. Most of the clays analysed by Denny are infants and can only manage to write MUM. He is hoping that less juvenile clays will learn to write SHALE, and very old clays that have led a stressful life will write SLATE. Let this be a warning to those Friends of Feldspars who claim that life began in ANORTHOSITE—it has too many letters to be described by any natural CSD.

The meeting was followed by the Group's Committee Meeting, bringing together for the first time six new



Chris Breen, N. J. Elton, Jeremy Hopper, and Dick Merriman

Karuna Eberl

ed saponite to be widespread in Triassic sandstone used as a building stone in Belfast, and drew much speculation about the future dissolution of this fine city. If and when the streets of Belfast are awash with red

Denny Eberl had good news and bad, the latter concerning the demise of poor Ostwald who failed to ripen. The good news was the improved MudMaster computer programme for the measurement of clay particle



Dick Merriman and Christopher Jeans.

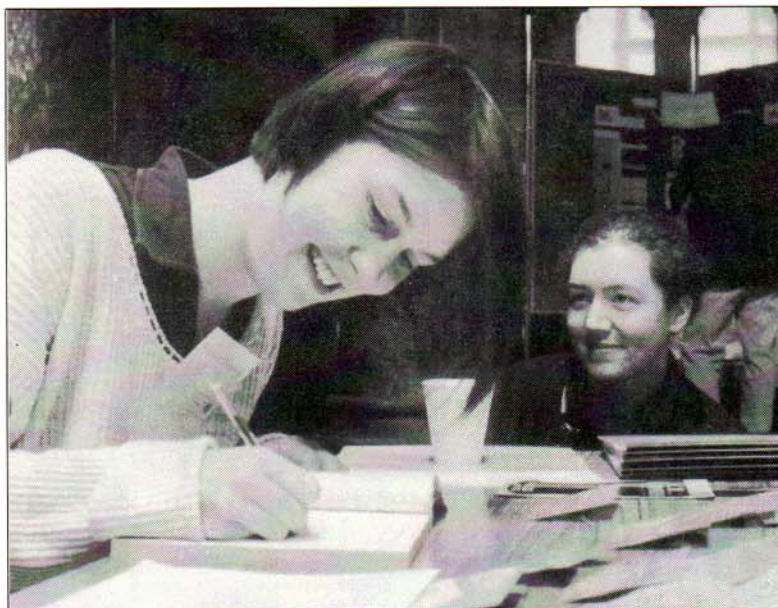
Karuna Eberl

members, including a new Chairman (Dick Merriman), Secretary (Steve Hillier) and Treasurer (Nick Elton). Fortunately the novices could turn for advice to the "elder statesmen" of the Committee, especially the Editor of *Clay Minerals* (Derek Bain) and the Associate Editor (Chris Breen). The Mineralogical Society's man in Dublin, Kevin Murphy, was also on hand for advice. Kevin has just moved from being Executive Secretary in London to Production Editor based in Dublin.

The Committee were able to express their thanks to Bruce Velde, who had recently completed a tour of British universities where he gave a series of lectures on future directions in clay mineral research. Bruce was sponsored by the Clay Minerals Group as part of a drive to revitalise interest in clay mineral research in Britain.

Dick Merriman
British Geological Survey
Keyworth, UK

Happy Birthday to the Missouri Mud-dauber!



Kerstin Hatfield and Jackie Connolly.

Karuna Eberl

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Division of International Programs, 4201
Wilson Blvd, Arlington, VA 22230

The National Science Foundation supports basic research and education in most fields of science and engineering. It does this through grants to US colleges, universities, and research institutions. Many of those grants involve research in foreign countries by US investigators. Some grants also include support for the participation of foreign scientists and engineers in research projects and seminars that take place either in the United States or the host country.

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Specific information can be obtained from the following program managers. Detailed information on this program, other NSF activities, and application procedures, is also available on the Web at: <http://www.nsf.gov>

International Research and Post-doc Fellowships: Susan Parris, sparris@nsf.gov, 703-306-1706

South Africa Program: Patricia Jones Tsuchitani, ptsuchi@nsf.gov, 703-306-0473

Japan and Korea Program: Christopher A. Loretz, cloretz@nsf.gov, 703-306-1701

Euroclay 99

Euroclay 99 was a roaring success, held in beautiful Krakow, Poland, a wonderful setting for the meeting. The number of attendees was unexpectedly high, and the number and quality of papers were exceptional. As usual, the meeting gave the opportunity to visit with old friends and make new ones.

The organizer of the meeting, Jan Srodon, should be very proud of Euroclay 99, as should his wife Aka, who served as co-organizer. The total attendance was over 500 and the number of papers contributed was over 300. The quality of the papers was quite good. The plenary lecture by Prof. Bob Reynolds was one of the best I have ever heard. It is unfortunate that it was not videotaped for those of you who could not attend. The meeting had fifteen different symposia and sessions. It was sometimes difficult to decide which session to attend.

The activities that organizers arranged for the participants were excellent. On Monday night we were treated to a 45-minute bus ride through rural Poland to partake of hors d'oeuvres and wine in the Castle of Pieskowa Skala. As the evening concluded, the participants were treated to an aria by one of the atten-

dees. On Tuesday evening the meeting banquet was held in the famous Wieliczka salt mine. The salt mine has been operating since the 14th century. For participants who wished, a tour of the salt mine was given prior to dinner. Throughout the mine, miners have carved statues with various themes. At one place on the tour a cathedral had been carved in one of the large salt caverns. Weddings are held there on a regular basis. The chandeliers were even made of crystal rock salt. The tour was great fun. The banquet itself was held in another large salt cavern. The food and wine were excellent, and the jazz band was enjoyed by all.

The meeting was held at the edge of the old city center of Krakow. The city was delightful with many interesting historic sites. Krakow is the site of Jagiellonian University, the fourth oldest in the world. Its center square is large and beautiful, with Poland's oldest restaurant (Wierzynek, established in 1364), St. Adalbert's church, Town Hall Tower, and the central town hall building

which houses many vendors of local goods and crafts. Many of the restaurants have outdoor seating, which was delightful, with the beautiful weather that prevailed. The food was excellent at each of the restaurants sampled. The prices were very reasonable,

especially the Baltic amber. Several other churches of interest could be found just off the main square as well as a portion of the original city wall. Toward the edge of the old central city overlooking the Wisla River is the Royal castle of former Polish kings.

As usual the meeting gave the opportunity to renew old acquaintances and make new ones. On Monday, Haydn Murray's students and a few friends held a luncheon to celebrate the reaching of the monetary goal for the endowed chair in his name. The food and fellowship was great. The students shared some very funny stories during the luncheon. There were stories about a German and beer in the lab refrigerator, someone having their fingers caught in a window when the air conditioning unit he was standing on collapsed,



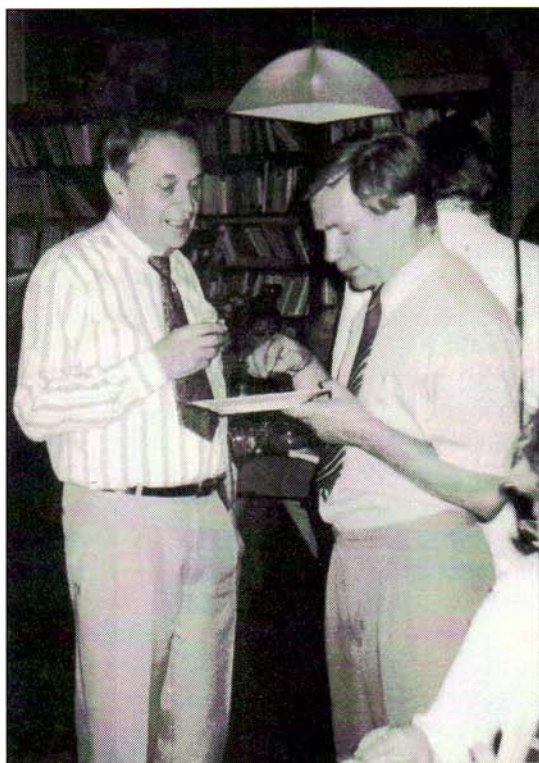
Aka and Jan Srodon, organizers of Euroclay '99.

Bella Zviagina



Lisa Heller-Kallai and Zachariah Kallai in Krakow.

Bella Zviagina



Victor Drits and A. S. Bookin at the Krakow meeting.
Bella Zviagina

and something about a belly dancer and a birthday.

To cap off a wonderful meeting, my trip back to the States was interesting. My direct flight from Krakow to Chicago only made one stop and a change of planes in Warsaw. It just goes to show you that there is a LOT that you can't believe.

Gary Beall
Chicago, Illinois

**How to organize a clay conference
Polish style**

Ten easy steps:

1. Invite 500 of your closest friends.
2. Pay for those who cannot afford to come.
3. Hold the reception in a castle.
4. Ask Oleg to sing love songs from its balcony.
5. Hold a dinner and dance in a salt mine.
6. Ask Aka and Jan to lead the first dance.
7. Have chamber music in a beautiful opera house, followed by a beer on the central square.
8. Be sure the mayor of the town also works with XAFS.
9. Ask Bob to give the keynote address on illite polytypes.
10. Hold the meeting in Krakow.

Denny Eberl

**The Clay Minerals Society
37th Annual Meeting**

Clays in the Past and Future Millennia

June 24-29, 2000

Water Tower Campus of Loyola University, Chicago

Workshop

Industrial Uses of Clays
organized by Willam F. Moll

Symposia

**Redox processes in clays: Agricultural, Industrial,
and Environmental Significance**

(J. Stucki)

Archaeology and clay (B. Velde & C. Shriner)

Agrichemicals and Clays

Vermiculites (B. Velde)

**Nanocomposite materials for the next
millennium** (T. Pinnavaia)

Clays in the human future

(J. Banfield & D. Ming)

Geology (D. Pevear)

Clay minerals and glacial stratigraphy

(D. Moore & C. Rovey)

Field Trip

**"Urban clays" with stops at the Art Institute,
landfills, gasoline station barriers, and
Argonne National Lab**

Contact:

Alanah Fitch, General Chair
Loyola University of Chicago
6525 N. Sheridan Road
Chicago, IL 60625

phone: 773-508-3119

fax: 773-508-3086

AFITCH@LUC.EDU

Http://cms.lanl.gov/loyola2000.html

A Brief History of Clay in Medicine

An abstract of a manuscript by W. R. Reinbacher

Two things happened about 100 years ago to Dr. Julius Stumpf of Wuerzburg (Germany). The first was that, as medico-legal court physician, he was asked to observe the exhumation of a female body possibly murdered by arsenic. The body, which had been buried in a deep clay layer of the local church cemetery for 37 months, was extremely well preserved. Stumpf thought that possibly the clay had inhibited putrefaction. The second thing was that he was called to a lonely farm where a patient had long been suffering from a deep and suppurating ulcer of the tibia, extremely malodorous. The patient refused an amputation, so Dr. Stumpf bandaged the ulcer with a thick layer of fine clay. Immediately the wound ceased stinking and after four days of repeated clay bandaging the ulcer had healed. Stumpf treated more old and also new wounds with a kaolin type white clay available from German drug houses as "Bolus alba" or "Argilla." In case after case, his success was astounding, and word spread in the German medical community. Stumpf attributed the success to the extreme adsorbent quality of the fine clay.

Thirty years before Stumpf, an American surgeon, Addinell Hewson, had used a yellow construction clay to deodorize offensively putrid wounds in his hospital ward. His idea about deodorization came from George Waring who had invented the clay toilet (as opposed to water closet). Hewson experienced that the clay not only deodorized, but also cured an ulcerated tibia and then many more injury cases. Two hundred years earlier than Hewson, a professor of medicine in Kiel (Germany), Johann Daniel Major, cured a long-suffering woman from her tibia ulcer by using calcium car-

bonate (moonmilk) as bandage medium.

A few years into the 20th century, Stumpf experimented with Bolus alba taken internally to stop vomiting, diarrhoea, dysentery, and eventually Asiatic cholera. His and others' case histories proved the successes even in cases of diphtheria (strep throat). Again the medical community took to the treatment. Russian and German governments supplied WWI infantry soldiers with bolus alba against trench dysentery. Stumpf concluded that the fine clay particle size (< 0.002mm) was smaller than the bacteria. Thus the clay enveloped the bacteria, removed them from nutrients, and flushed them out.

Surprisingly Stumpf did not know that about 50 years before him, the famous German "clay pastor" Sebastian Kneipp (really better remembered for his water cures) had used clay to cure wounds, itches, scales, contusions, and swellings as well as diarrhoea with clay. How far back in history could clay treatment be found?

Would you believe 5,000 years? The ancient Tablets of Nippur in Mesopotamia, written about 2,500 BC in Sumerian, listed clay as medicament for healing wounds and stopping "fluxes from the body." The famous Papyrus Ebers, written in 1550 BC and containing at least 30 centuries of prior medical experience, is the world's oldest book. It lists among ailments diarrhoea, dysentery, tapeworm, hookworm, wounds, and abscesses, and under mineral remedies "clay-from-the-gate," "clay-from-a-statue," "clay-from-the-wall," and masons' clay. Due to a mistranslation the ancient Egyptian word "d'd" (didi) was not recognized as red clay until 1932.

Similar information on earths and

healing wends through a thousand years, described by Greeks from Homer via Hippocrates and Soran of Ephesus to the Romans Varro, Estrabo, Pliny the Elder. Unfortunately for us, clays or earths were always identified only by location or provenance, and the Latin term "terra" could mean a whole lot more than clay, everything found in or on the earth, even such minerals as "alum," chalk, borax, bitumen and fossil shells.

The most famous clays were Bolus Armenus (a red clay) from caves in the Cappadocio mountains in what was Armenia and is Turkey now, and the "earths" from the Greek Islands Lemnos, Chios, Samos, Melos, Kimolos. Of these the most prominent was the "Terra sigillata" from Lemnos, sigillated because after the clay was formed into little discs, it was imprinted with a picture or seal of the goat, the sign of the goddess Diana (or Artemis). It was a white clay, astringent, desiccating, and insoluble, fine rather than sandy, used for the same illnesses mentioned centuries before. It also relieved stings of poisonous insects, dispersed swellings and tumors, and aided excessive menstrual bleeding. The clay from Kimolos was identified as calcium montmorillonite by R. H. S. Robertson of Scotland in his book "Fuller's Earth, A History." Other island clays were described only by their colors (white, yellow, reddish, red, green, black) and by their feel (fatty, light, friable, sticking to tongue), each with their own their medical niche.

Dioskorides (40-90 AD), the ultimate pharmacist until Lavoisier, and Galen of Pergamom (129-199 AD), the pope of physicians for 1600 years, described these earths and their "virtues," their healing power.

Emerging Christianity mentions the first clay treatment in the New Testament, when Christ cured a blind man with spittle and earth put on his eyes. A later earth attributed to St. Paul was sold from Malta (probably calcium carbonate) with many fancy seals. (Paul had been shipwrecked on the island).

Arabian medicine, which followed after the fall of Rome, continued writing about healing clays. Avicenna refers to the "clay of Ani," meaning Armenian bole, and "terra sigillata" (which then meant clay from Lemnos). Rhazes included under mineral curatives coral, borax, pitch, Yemenite alum and houri clay from Egypt, a very fine clay.

These famous clays were very expensive, used as gifts between kings and potentates, and not affordable in Europe except to high nobility. So since about the 15th century people were looking for local clay sources which promised to be as good as Armenian bole or sigillated earth from Lemnos. In 1565 Conrad Gessner from Zurich wrote about moonmilk, and Georgius Agricola wrote about medical properties of clays: warming, cooling, astringent, soft to the touch, light, and identifiable by taste. From the taste physicians should know for what ailments to use which clay. Individual clays were mixed with vinegar to alleviate swellings and contusions and sprains (until 1930!), and a Norwegian clay with lemon juice to cure widespread scurvy (until Vitamin C was discovered).

By the middle of the 18th century nearly one hundred healing earths from Moravia to France were found and publicly advertised in patent medicines. They were listed in pharmacopoeias and lexica, usually as compounded medicines with 10 and more different botanical, zoological and mineral ingredients, but Armenian bole and the original Lemnian Terra sigillata had become generic terms for any red or white

clay. The 18th century brought the discovery of the elements aluminum and silicone, widespread clay components. It also brought scientific explorations which disclosed a worldwide use of clays as medicine by indigenous peoples. Unfortunately, knowledge of most clay compositions had not yet spread, so that descriptions of geophagy never clearly identified the type of clay or earth consumed for medical, religious, or habitual reasons or to alleviate hunger. Geophagy still existed in sections of America in modern times as it had thousands of years before when pregnant women ate the thin dishes made out of a very fine clay. Fifty thousand years ago, Australian aborigines are said to have eaten medical clay and even the earth from termite hills to improve lactation.

In 1956 evidence was found that clay's ability to exchange cations made it a better remedy for heavy metal poisoning than milk and activated charcoal, but actually in 1581 a condemned man was given the choice of imminent extinction (usually hanging, beheading, or quartering) or taking 6 grams of mercury chloride followed by a dose of clay. The poor guy had a tough time, but he survived and was freed.

The conclusion is: Yes, clays have been used in medicine since prehistoric times, as man observed ungulates licking clay when new grass gave them diarrhoea. But which kinds of clays were the healing ones? Maybe one of the readers knows; I could use the help..

A final thought: Today you can buy in any pharmacy in the US an anti-diarrhoeal patent medicine, which consists of 75% attapulgite or palygorskite, in Germany 75% kaolin. So if you feel an intestinal unease, take two clay tablets and e-mail your doctor.

W. R. Reinbacher
730 Holly Oak
Palo Alto CA 94303
e-mail: Rudychris@aol.com

Endnotes

Julius Stumpf, "Die Verwendbarkeit des Thons als antiseptisches und aseptisches Verbandmittel. in: Muenchener medizinische Wochenschrift # 46, pp 1466-68, 1898.

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Julius Stumpf, Ueber ein zuverlaessiges Heilverfahren bei der asiatischen Cholera sowie bei schweren infektoesen Brechdurchfaellen, A. Stuber Verlag, Wuerzburg, 1906, passim.

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Cyril P. Bryan, Transl. from German, The Papyrus Ebers, D. Appleton & Co, New York, 1931, Chapters 3 and 5.

A whitish transparent mineral salt, a double sulfate of aluminum and potassium.

A good synopsis of the Greek and Roman periods concerning medical clays is Dr. G. Spanudis, "Geschichtliches zur Heilerde", in:

Pharmaziewissenschaftlicher Monatsbericht, Vienna, Heft 15, p. 302 ff. Volturna Press, Hythe, Kent, UK, 1986 Avicenna (Ibn Said) Canon of Medicine Vol.2

Martin Levy, Transl. The medical formula of Agrabadhin of Al-Kindt (Rhazes). U. of Wisconsin Press, Madison, 1966

Conrad Gessner, "Descriptio montis fracti" in: De rarior et admirandis herbis... Zurich, apud Andream & Iacobum Gesnerum, fratres, 1555.

See W. R. Reinbacher, "Is it gnome, is it Berg, is it Mont, is it Mond? An updated view of the origin and etymology of moonmilk", in: National Speleological Association, Bulletin 56: 1-13., June 1994.

Georgius Agricola, de natura fossilium, Lib X. I used the English translation by Mark Chance and Jean A. Bandy, Geological Society of America Special Paper #63, November 1955, especially Book II and III.

continued on page 31

Common Ground World Project

Several years ago artist Neil Tetkowski innocently wrote in his journal, "It would be fascinating to take clay from every country of the world and create a "world clay body"—make a symbol, a metaphor of the world as we know it; separated by borders, politics, religion etc., but united on this one fragile planet Earth."

For two years he considered this recurring idea to be just another wild fantasy, far too complicated and costly to actualize. However, a year ago his thinking changed when he realized that a great collective effort could bring in clay from 185 countries. The Common Ground World Project was born, and the symbolism grew in significance. Today, people of diverse cultures, ages and backgrounds are working together to collect the clay, and the project is officially endorsed by the Department of Economic and Social Affairs at the United Nations. They have begun the process of clay collection which requires mobilizing the clay community throughout the world.

This is an excellent opportunity for the readers of *CMS News* in over 100 countries to help advance the field of geology in the eyes of the world. By helping to create the "world clay," you will be part of a global effort.

The United Nations will use Common Ground World Project to focus attention on the concept of sustainable development: the idea that the diverse people of the world must share the earth's finite resources in a cooperative way that benefits not only themselves but future generations, other cultures, and the planet at large. In 2000, the "world clay" mixture will be used to create a sculpture at the United Nations Headquarters in New York City involving all member states. Through international communication and joint effort, a World Mandala will be created, symbolizing the cooperation and respect for the environment that is possible among the diverse people of the world.

All geologists are invited to join with other enthusiastic participants around the world to contribute to the project. This is an opportunity for

individuals to make a real difference. If you want to participate, contact Common Ground World Project as soon as possible to let them know you will collect the clay. They are asking that a 2.5-5 kilo dry clay sample be placed in a heavy duty bag and shipped by courier to Standard Ceramics, Box 4435 Pittsburgh, Pennsylvania 15205 USA. If you live in a country without clay, sand or even volcanic ash will work. You will be registered as a representative for your country and sent forms to be returned with the clay. If you are not able to get clay, but would like to support this project financially, a tax-deductible contribution in any amount will be helpful. Checks may be made to the New York Foundation for the Arts and sent to the address below.

More information at:
<http://www.petroglyph.com/CGWP.html>

Write to Clay Collection, CGWP, 432 W. 19th Street, New York, NY 10011; phone 212-255-1850 or e-mail CGWP@aol.com

Volume 9, continued from page 1

and Soil Science," by S. Fendorf; "Application of Polarized EXAFS to Fine-Grained Layered Minerals," by A. Manceau, M. Schlegel, D. Chateigner, B. Lanson, C. Bartoli, and W. Gates; "New Opportunities for Micro-crystalline and Powder Diffractometry at Synchrotron Sources," by J. Parise; "Hard X-ray Synchrotron Microprobe Techniques and Applications," by S. Sutton and M. Rivers; "Synchrotron Infrared Microspectroscopy: Applications to Hydrated Minerals," by R. Lu, A. Goncharov, H. Mao, and R. Hemley; "Soft X-ray Optics and Spectromicroscopy: Potential for Soil Science Specimens," by C. Jacobsen and U. Neuhäusler; "Reactions of Clay Particles in

Aqueous Dispersions Studied by X-ray Microscopy," by J. Niemeyer and J. Thieme; "Real-time X-ray Diffraction of Montmorillonite Dehydration and Rehydration at Pressure and Temperature in a Diamond Anvil Cell," by W. Bassett and T. Wu; and "Obtaining Access to Synchrotron-Based Techniques," by P. Bertsch and D. Schulze.

The discovery of X-rays over 100 years ago and the subsequent discovery of X-ray diffraction 17 years later had a profound impact on almost all areas of the physical sciences. Clay Science is no exception. Modern concepts of clays are shaped to a great extent by information obtained from X-ray based techniques. The X-ray intensity obtainable from the

sealed-tube laboratory X-ray sources used for most clay research, however, has not increased substantially from that available during Röntgen's time. The increasing availability of synchrotron X-ray sources that produce X-ray beams up to a billion times more intense than laboratory sources is opening up whole new areas of research in many different fields of science.

Volume 9 is available at a cost of \$18, including shipping, for CMS and MSA members, and \$23 including shipping for non-members. (244 pages; ISBN # 1-881208-09-5) Please see ordering instructions on back page.

Feats of Clay

The Feats of Clay award of the decade goes to President **Pat Costanzo** who took and passed her bar exam, underwent major surgery, and dealt with routine and drastic business of the CMS, all in the last few months.

David J. Morgan, of the British Mineralogical Society, has been elected President of the Mineralogical Society of Great Britain and Ireland.

Congratulations to the winners of the student paper awards at the Indiana meeting: Best Student Paper: **E.J. Boyle-Wight**, from the U. of Maine, Orono, for "A spectroscopic study of multi-solute interactions in mineral/water systems;" Best Student Paper Runner-up: **C.A. Johns**, from the U. of Illinois at Chicago, for "X-ray structure of a trimethylsulfoxonium-exchanged vermiculite;" Best Student Poster: **M.S. Connors**, from SUNY-Buffalo, for "The use of BP clay to link antimicrobials for the prevention of microbial proliferation on hepa filtration material;" and Best Student Poster Runner-up: **C. Pitteloud**, from U. Lausanne, Switzerland, for "The structure of interlayer water in Wyoming-montmorillonite studied by neutron diffraction with isotopic substitution."

The recipients of Student Research Grants are: **Janet Bertog**, student of **Warren Huff** at the U. of Cincinnati, for "High-resolution correlation of the transgressive phase of the Claggett Cycle using bentonite stratigraphy;" **David C. Ray**, student of **Warren Huff** at the U. of Cincinnati, for "A K-bentonite Stratigraphy of the Much Wenlock Limestone Formation England;" **Dorothy J. Vesper**, student of **Wm. B. White** at Pennsylvania State U., for "Mechanisms and timing of trace metal transport in a karst aquifer: impacts on spring water quality;" **John L. Daniels**, student of **Hilary I.**



The late Philip Low and CMS President Pat Costanzo.



CMS Travel Grant recipients Cédric Pitteloud, Michael Gay-Duchosal, Shaoneng He, Candice Johns, Javiera Cervini-Silva, Youjun Deng. High Iron Photos

Chiago; and **Shaoneng He**, student of **Fred Longstaffe** at the U. of Western Ontario. Their presence at the meeting was much enjoyed.

New Council members elected on the 1999 ballot are **Amos Banin**, **Eric J. Daniels**, **Alanah Fitch**, and **Douglas W. Ming**. **Jessica Elzea Kogel** is the Vice President Elect Nominee.

Next year's Brindley Lecturer will be **Dewey Moore**, the Jackson Lecturer will be **Jill Banfield**, and the Pioneer Lecturer will be **Bill Moll**. **Boris B. Zviagin** will be the first Bailey Distinguished Member.

Inyang at U. of Massachusetts Lowell, for "Enhancement of clay-based barrier material resistance to freeze-thaw cycling via polymer amendment;" **Lea Greenwood**, student of **Ray Ferrell** and **Wayne Hudnall** at Louisiana State U., for "Exchangeable Ca⁺² and Mg⁺² in acid soils in southwest Louisiana;" **João José Granate de Sa'e Melo Marques**, student of **Darrell Schulze** at Purdue U., for "Trace element distributions in Brazilian soils."

Student travel grant awardees were: **Michael Gay-Duchosal** and **Cédric Pitteloud**, student of **Hugh Powell** at the U. of Lausanne; **Youjun Deng**, student of **Joe Dixon** at Texas A&M; **Javiera Cervini**, student of **Richard Larson** at the University of Illinois Urbana; **Candice Johns**, student of **Steve Guggenheim**, at the U. of Illinois at

Archives

Now, for a new challenge...

Walter Keller sent in the photograph below of the Fourth National Clay Conference, held at Penn State in 1955. How many people can you identify?



Dr. Keller has identified the following possibilities around the picture: Rustum Roy, Osborn, C.S. Ross, Griffiths, Johnson, Weaver, Kühnel, Krynina, Jeffries, Bates, Keller, Grim, J. M. Alsareda, G. F. Wheeler, V. Hoffman, Willy DeKeyen, J. White, T. Sudo. *Editor's note: editor's spelling may not always be correct.*

And another...

This photo was taken at one of the receptions in Oxford at the 1978 International Clay Conference and recently sent in by Bob Hall, who says, "For me and Annie it was the best of all the ICCs we attended..."



Second from left is yours truly, but I cannot identify the others although they all seem vaguely familiar. Annie says the man on the left is Dr. Radko Kühnel, Delft University and the lady is Radko's wife, Libuse... Strange, I did not recognize Radko and Libuse, as we have known them since 1972." Please let us know if you can identify the others.

Meeting Calendar

2000, Rabat: Committee on Neogene Stratigraphy. Problems of Neogene geology in the Mediterranean and related regions. Contact: Vlado Sucha, Dept. of Geology of Mineral Deposits, Comenius University, Mlynska Dolina G, 842 15 Bratislava, Slovakia. Phone: 421-7-60296274; fax: 421-7-65429064; sucha@fns.uniba.sk

April 30-May 3, 2000, St. Louis, Missouri: American Ceramic Society 102nd Annual Meeting & Exposition. Contact: American Ceramic Society, PO Box 6136, Westerville, OH 43086-6136. Phone: 614-890-4700; fax: 614-899-6109; customersrvc@acers.org; www.acers.org

April 17-20, 2000, Manchester, England: Third Biennial Geoscience Conference. Contact: The

Conference Office, The Geological Society, Burlington House, Piccadilly, London W1V 0JU, UK. Phone: 0171-434-9944; fax: 0171-494-0579; geo2000@geolsoc.org.uk; <http://www.geolsoc.org.uk>

April, 2000, Rondebosch, South Africa: SEG-5, 5th International Symposium on Environmental Geochemistry. Contact: M. Fey, Department of Geological Sciences, University of Cape Town, Rondebosch 7701, South Africa, fax: 27-21-650-3783.

July-August, 2001, Universidad Nacional del Sur, Bahia Blanca, Argentina: 12th Annual International Clay Conference. Organizing Committee Chair Dr. Eduardo Dominguez, Secretary General Dr.

Fernanda Cravero; Phone: 54-291-459-5101, ext. 3041; fax: 54-291-459-5148; 12ICC@criba.edu.ar

June 24-29, 2000, Chicago: CMS 37th Annual Meeting. Clays in the Past and Future Millennia. Contact: Alanah Fitch, Loyola University of Chicago, 6525 N. Sheridan Road, Chicago, IL 60625 USA. Phone: 773-508-3119; fax: 773-508-3086; AFITCH@LUC.EDU; [Http://cms.lanl.gov/loyola2000.html](http://cms.lanl.gov/loyola2000.html)

September 17-22, 2000, Madeira: 1st Latin-American Clay Conference. Clays in Volcanic Environments. Contact: Dr. Celso S. F. Gomes, Universidade de Aveiro, Campo Universitário Santiago, Dept. de Geociencias, PT - 3810-193 Aveiro, Portugal. Phone: 351-34-370200; fax: 351-34-370605; cgomes@geo.ua.pt

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National Academy of Sciences Colloquium

Jill Banfield (Biological impact on silicate mineral dissolution...); Paul Bertsch (Advanced characterization of complex mineral assemblages and of contaminant-mineral interactions...); Gordon Brown, Jr.; Peter Buseck (Airborne minerals and related aerosol particles...); Rodney Ewing, Robert Finkelman, Miriam Kastner, Keith Kvenvolden, Fred Mumpton (Natural Zeolites); Robert Nolan, Kirk Nordstrom, Dave Pevear (The story of illite—How microscopic clay crystals constrain the thermal history of giant sedimentary basins and help us find oil); F. D. Pooley; Jeff Post (Manganese oxides: Batteries and beyond); Joseph Prospero; John Sherman; J. V. Smith; Garrison Sposito (Surface geochemistry of clay minerals); and Sam Traina (Geochemical controls on contaminant bioavailability in soils, sediments, and aquatic environments) were guest speakers at the NAS Colloquium, "Geology, Mineralogy, and Human Welfare" in November last year.



Fred Mumpton at the NAS Colloquium.

Dave Pevear

Editor requests help with English-as-a-second-language papers

Clays and Clay Minerals is truly an international journal, with a large number of papers originating from countries where English is not the main language. Because of this, many scientifically-sound papers submitted to *Clays and Clay Minerals* cannot be sent to reviewers without major changes in the quality of the writing. Unfortunately, these papers are currently being returned to the authors as "unacceptable" because a reviewer should not be asked to both judge the science and to completely re-write a manuscript.

We are asking for help with those

manuscripts that appear to be scientifically creative, but from a foreign author who may have problems writing in English. Several criteria may be important, including (a) whether you are knowledgeable in a particular subject area, (b) whether you understand sufficiently the foreign language of the author, and (c) whether you have the time to help. Only the latter appears critical, although the other criteria may be useful.

Please contact S. Guggenheim (clayed@uic.edu) if you would like to volunteer. Provide us with the number of manuscripts you feel you

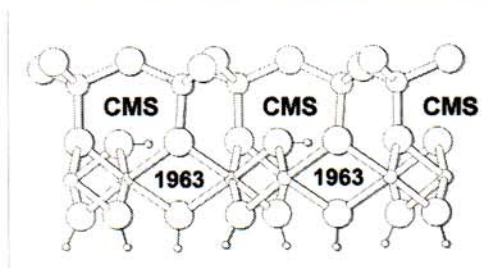
can handle over a year, whether you have special interests, and if you have knowledge of specific languages that may help in interpreting manuscripts.

Most foreign authors are especially grateful to have manuscripts reviewed for English content, and your contribution will be included in the acknowledgement section of the paper. Please feel free to volunteer for as few as one paper—even this would be of great help.

Steve Guggenheim
La Grange, Illinois

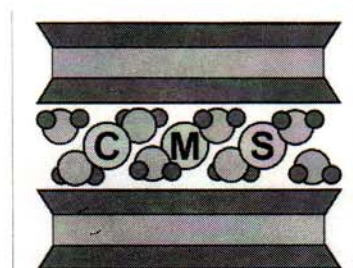
CMS logo contest

At the last CMS meeting, then-president Dave Bish announced a logo contest to find a new logo, not to replace the CMS seal, but for use in advertisements and on flyers and so forth. He showed the gathering two logos, one designed



Dave Bish's logo entry

by himself and one by "someone else." President Pat Costanzo has appointed Jean Hemzacek Chair of the logo contest. To find out the criteria for the contest and to enter, please contact Jean at 531 S. Monterey Ave., Villa Park, IL 60181 USA. Phone: 630-279-7894; fax: 630-279-3569; prismsjr@msn.com



Someone else's logo entry

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Medical clays,

continued from page 23

e.g. Terras Medicinales in disputatione... Praeses Johann August Rivino, Leipzig . 1723
Pharmacopoeia Galeno chemica, catholica, by Joannis Danielis Horstii. 1651.

Zedler's Universal-Lexikon, 1732-1750, columns Siegelerden, bolus, terrae

A complete history of Drugs, transl. from Pomet, Tournefort & Lemery 1712

There are over 300 sources and articles. A good survey of clay eating is by B. Lauffer, 1930, "Geophagy", in: Field Museum of Natural History, Publication 280, Anthropological Series XVIII # 2, Chicago

See D. A. K. Black, "Evaluation of Terra Sigillata", in: Lancet, Oct. 27, 1956 p.883.

In a letter to the office, W. R. Reinbacher asked if any of our members could help him locate "clay analyses by location and not only the large deposits of commercially interesting clays. If this question gives you a headache, take some Bolus alba with wine..."

Don Scafe donates archival photographs

Don Scafe has placed in the history files of the Society his index to his extensive collection of slides and negatives of Society people and activities along with an explanation of his index for this collection. Don has stipulated in his will that these negatives and slides come to CMS. However, he anticipates that he will send them to the CMS historian at the time when he stops attending Society meetings so that he knows they have been transferred successfully. The plan would be to accompany the negatives with a copy of the captions. The slides have the captions written on the mounting.

Don began collecting photos at the 1969 meeting held at the Inn of the Six Flags, Texas (between Dallas and Fort Worth), and has missed few since then. He also has covered several of the international meetings during this time. For the few gaps in his photographic record, I'm asking Society members to clean out their desks and filing cabinets in search of photos of any kind for the following meetings:

Anything pre-1969, 1969 3rd International meeting held in Tokyo, 1970 at Miami Beach, FL, 1972 4th International meeting held in Madrid, Spain, 1978 6th International meeting held in Oxford, 1981 7th International meeting held in Bologna, Italy, 1985 combined CMS and 8th International meeting held in Denver, CO, 1989 9th International meeting held in Strasbourg, France, 1993 10th International meeting held in Adelaide, Australia

Photos to be of value need to have people, places, and events identified. If you're in doubt about some identifications, bring them to the next CMS meetings and solicit opinions. You know that many of your colleagues will be more than ready to offer opinions and memories.

Manuscripts of addresses by Distinguished members and Presidents of the Society also are candidates for archiving.

As the current Historian of the Society, I will serve as temporary custodian of archival material until the Society can establish a permanent archive. So, please send material for the Society archives to me at: D.M. Moore, Illinois State Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820, USA; (217) 244-2785; moore@isgs.uiuc.edu

A vigorous group such as ours needs to have a sense of where we have come from, how our collective understanding of clay minerals has developed, as much as we need to have a sense of where we are going. The Society will appreciate your giving this some thought.

Early conversations(1995) on the CMS listserver

The CMS listserver now has hundreds of subscribers, who discuss serious questions about clays. It wasn't always like this...

Hi Guys, Since there are only seven of us on the list of subscribers so far, two of whom are Cliff Johnston, and the other four of whom are also inclined to be friendly, I'm going to be brave and send a letter to the entire list. I'm taking a poll. The results

will be studied carefully and be published after being peer-reviewed. Who has the best hair in the Society— Warren Huff, Dave Pevear, Joe White, or Denny Eberl? Jo (Eberl)

Good! This list is off to a promising start with a topic certain to occupy an entire half-day symposium at next year's CMS meeting. Did I ever tell you about the time I..... Well, never mind.

I'll save it for later. In the meantime, Huff clearly has the lead, but only because he never seems to comb his hair (he does, but it won't stay put). But the hands down winner would be Pevear if only he would reconstitute his pony tail of pre-Exxon days. How about it Dave? Warren (Huff)

It appears that this list server was a HAIR-brained idea. Steve (Chipera)

My top vote for best hair in CMS would have to go to Denny. His well-groomed, free-sprited mane just edges out Pevear's "where's the fire" coif (which is somewhat similar to S.Y.'s on most days). P.S. Don't tell S.Y. I said this! Mark (Elless)

Joe White, no question. Denny (Eberl)

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*Adieu**Good-bye, Jo Eberl, we will miss you*

December 31, 1999 is the day that ushers in the new millennium. The world will celebrate. For CMS members, however, December 31, 1999, marks the end of a different era; it will be Jo Eberl's last day as CMS Manager. Patricia "Jo" Eberl, wife of Denny Eberl, President CMS '93-'94, has been with the Society for a decade. For those of us who had the pleasure of working with her, it seems as though she has been taking care of the office, and of us, for a much longer time. Jo and I have worked through many Society problems together. We make a good team. But then, Jo makes a good team with everyone who needs her assistance.

When Jo started with the CMS, she was sent about 20 boxes of "files." There was no training period. She had to learn by doing. Jo's learning never came to an end. Year after year, new duties were assigned to the Office. CMS Council members are energetic and creative people and manage to resolve many of CMS concerns at the annual Council Meeting. Many, if not most, of these resolutions, however, resulted in new duties for Jo. In December, when the records will be moved from Jo's office to the new office, a truck will have to be rented. There are now hundreds of boxes of files, books, records, and equipment.

During Jo's tenure with CMS, the Society experienced many changes, additions, and improvements. It was Jo who created our newsletter in its present form, with interviews, retrospectives, commentaries, Feats of Clay, the Clay Doctor, student and sustaining member profiles, and archival material. It was Jo who initiated our connection with Linus Pauling. Many of the jobs once handled by officers and committees have been transferred to her. All of the

workshop volumes, which have considerably changed the workload of the office, have been published since she began. People are so used to many of the programs and policies that are now established parts of the CMS that they no longer remember, if they ever knew, how many of them were initiated or created by Jo. She was especially active in recognizing that the CMS is an international organization, and worked to make the Society's programs more accessible to all its members. She made a special effort to introduce students, newcomers, and new members from other countries to the more established members of the Society, and was the one who started the tradition of inviting so many senior members to the student receptions. Many lovingly called her the "Mother of the CMS," and in creating so much warmth and a sense of family within the Society, she earned the nickname.

Jo was much more than a Manager; she was the CMS corporate memory. Although there really is a truckload of material to transfer to the new office, much of what Jo did was in her head, and in her heart. Jo always cared about the quality of her work, but, more importantly, she cared about our members. She kept tabs on all of us; she knew who was out of town and couldn't be reached, or who was overworked or sick and shouldn't be reached. Jo was our "go-between," she kept us in touch with each other, she kept CMS functioning and functioning smoothly. What needs to be done next? The answer was usually, "Call Jo; she will know." When any of us were overwhelmed, Jo was there to help. She would write a letter, make phone calls, edit what we wrote, and remind us of those things that we hadn't done yet (something she often had to do several times but always with a



Jo Eberl.

Dave Pevear

smile). Jo was also a confidante, someone everyone—students, newcomers, old-timers, spouses—felt comfortable approaching with concerns and questions, or just to feel that they had a friend in the crowd.

We will dearly miss Jo. For those of you who haven't yet had a chance to say good-bye, please join me in expressing our appreciation for all that Jo has done and been and to wish her well in her new endeavors. You can reach Jo at harper2@rmi.net

Patrica M. Costanzo

President, CMS

Buffalo, New York

Search Committee

Just so you know what the process of choosing the new CMS Manager was, Jessica Elzea chaired a committee including Ray Ferrell, Randy Hughes, Jean Hemzacek Laukant, Kathy Nagy, Bob Pruett, and Charles Roth, who evaluated bids for the position and made their recommendations to the Executive Committee and Council for approval.

Good-bye, dear friends

Good-bye, dear friends. You have been like a second family to me, and I will miss you all very much. I had thought I would stay with the Society forever, but it is time for a change for both the Society and for myself.

I would like to thank so many people, everyone who has helped and advised me, laughed and cried and argued with me over the years, and especially those who have been such friends during the past difficult months. Please know that you have meant more to me than you

can possibly imagine. And so many more of you, with whom I haven't worked closely, but who have filled me with such delight! I would like to single out Pat Costanzo, who, besides being a hard-working, sensible colleague all these years, has been a President of incomparable support and intelligence, creating harmony and making good decisions during a hard time.

You all have so many fine qualities, but the one I admire most is the combination of a superior mind

with a great heart. Those are the people who have the power to change the world for the better, on a personal as well as on a global level. There are many such people among you. The Clay Minerals Society is truly a remarkable collection of people, something to be treasured.

Thank you for all you have given me. I wish you all happy and fulfilling lives.

Jo Eberl
Boulder, Colorado

Banfield, continued from page 1

Program, says, "We look everywhere for the most exciting among us and give them a chance to follow their best instincts over an extended period of time. There is something magical about it all. No one can apply for a MacArthur Fellowship. New Fellows get one phone call out of the blue in June, and five years of opportunity. It is life changing for Fellows. It provides encouragement to others engaged in creative work, and it gives joy to the rest of us that such talented men and women exist."

Jill Banfield, a mineralogist at the University of Wisconsin, has contributed fundamental insights into the physical and chemical forces that shape the earth's surface. Her structural studies reveal the mechanisms of rock weathering, helping to explain how elements such as toxic heavy metals can accumulate within soil. She has shown that certain microbes (such as "extremophiles") living between rocks exert profound chemical effects on those rocks, both at the surface and deep below. These

observations may lead to an enhanced understanding of soil and sediment formation, factors affecting water quality, and environmental processes, as well as provide clues to the origins of life on earth.

"The techniques of molecular microbiology are now relatively accessible, so we can start to explore the microbiological communities present in the natural environment," says Banfield, whose fellowship is \$290,000.

A slightly early happy 100th wish, Walter!

In March 2000, CMS wants to wish Walter D. Keller a Happy 100th Birthday. Dr. Keller is a Distinguished Member, Past President, and most importantly, a Cherished Treasure of the CMS. He has been a friend and teacher to many and has kept the pages of *CMS News* hopping with his musings.


We hope everyone will remember to send their birthday greetings to our favorite *Homo Sapiens*. You can reach him through Bill Johns at johnsw@missouri.edu, or at the Department of Geology, University of Missouri, Columbia, Missouri 65211, USA.

Thank you for 100 years of delighting the rest of us. Happy Birthday, Walter!

~~100th~~
Happy ~~98th~~ to a Gem of a Customer.

Dr. Walter D. Keller, MU Professor Emeritus-Geology, has been a First National Bank customer for 80 of his 98 years. On the occasion of his 98th birthday, we send our congratulations and our thanks for being a loyal customer.

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Dr. Walter D. Keller

Columbia Daily Tribune March 13, 1998

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To join the CMS, please send a copy of the application below, along with the required dues in U.S. funds, drawn on a U.S. bank, to The Clay Minerals Society, P.O. Box 460130, Aurora, CO 80046-0130 USA. Visa or Mastercard may also be used. Please include card number, expiration date, and name as it appears on the card. Subscribing members receive *Clays and Clay Minerals*, the journal of the CMS.

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Thermal Analysis in Clay Science, CMS Workshop Lectures, Volume 3, Bish, Mumpton, & Stucki, editors, **\$13.00**

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Mica Polytype Slide Set, Prepared by Audrey C. Rule for the CMS, **\$18.00**

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