
CMS News

A Publication of The Clay Minerals Society

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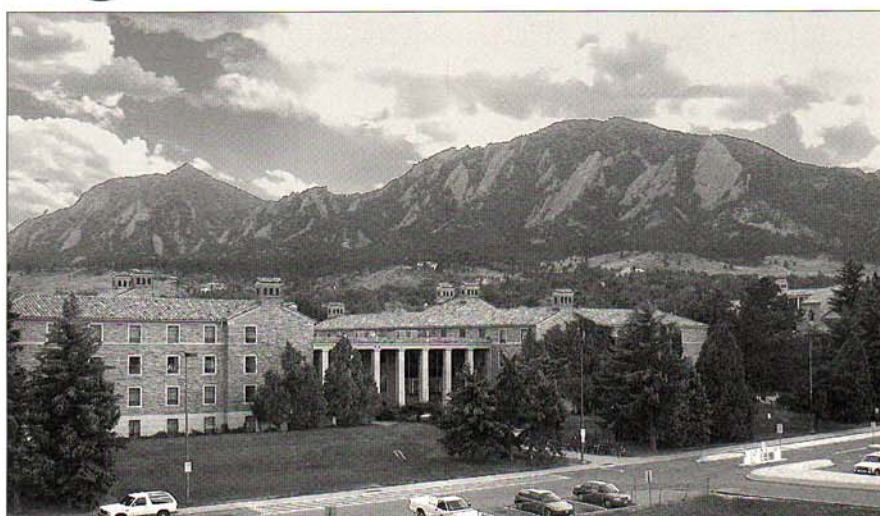
June 8-13, 2002

Clay Mineralogists Meet in Boulder

– Submitted by Peter Ryan

The 39th annual meeting of the Clay Minerals Society was recently held on the campus of the University of Colorado in Boulder. The meeting opened on Saturday June 8 with the workshop “Teaching Clay Science”, a day-long session organized by Audrey Rule and Stephen Guggenheim that included numerous presenters and a wide variety of topics. Following an all-day Council Meeting on Sunday (or for those of us not on council, a day of hiking in the Rockies), we convened for the ice-breaker reception overlooking Folsom Football Stadium and the Front Range in the distance.

The Plenary Session opened with welcoming remarks from Kathy Nagy, Chair of the Organizing Committee, who acknowledged co-Chairs Alex Blum and Dennis Eberl, as well as

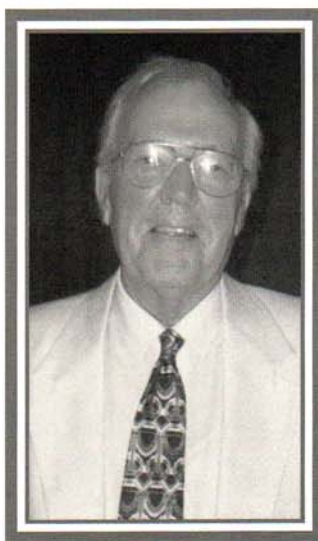


Campus at University of Colorado in Boulder

Field Trip organizer Dan Kile, workshop organizers Rule and Guggenheim, and the numerous sponsors and symposia coordinators. Boulder

mayor Will Tool, a physicist and environmental scientist, welcomed CMS members to Boulder, as did

(story and photos continued on page 4)



Murray Elected to National Academy of Engineering

The National Academy of Engineering has elected Haydn Murray to its ranks. Election to membership recognizes Murray’s “important contributions to engineering theory and practice,” specifically his “pioneering work on the mineralogy and industrial applications of clays,” according to the announcement by the academy. Election to the academy is one of the highest honors an engineer can achieve. Murray, professor emeritus of geological sciences, is Indiana University’s first electee to the National Academy of Engineering. He joins 10 IU colleagues who are members of the National Academy of Sciences and five who are members of the Institute of Medicine. Colleagues consider Murray a pioneer in the area of clay mineralogy. In 1957, he left his faculty positions in the Department of Geology and the Indiana Geological Survey at IU Bloomington to join Georgia Kaolin Company as its director of research. He moved through the ranks to executive vice president; a position that he held for nine years. Murray returned to Indiana University in 1973 as Geology Department chair. In 1984, he founded his own consulting company, H.H. Murray & Associates, and he continues to be active in research. In 2001 he established the Applied Clay Mineralogy Chair at IU. David Bish of Los Alamos National Laboratory will become the first scientist to hold this distinguished position.

The Clay Minerals Society



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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 non-institutional members. Membership rates (2003) are as follows: full membership, including a subscription to *Clays and Clay Minerals*, \$70.00/year; student membership, \$15.00/year; nonsubscribing membership, \$35.00/year. Institutional subscriptions to *Clays and Clay Minerals*: \$235.00/year (\$250.00 overseas) for the year 2003. Please contact the Society Office for information regarding new 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.

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Student Travel Grants

CMS Student Members who will be presenting a paper at the annual CMS conference are eligible for this grant. The grant covers expenses up to \$500 for travel to the CMS annual conference. Deadline is April 1. Applications are available online at <http://cms.lanl.gov/travel.html> or from the CMS office.

Student Research Grants

The Clay Minerals Society annually awards several grants of up to \$2500 in Student Research Grants. The program provides partial financial support of masters and doctoral research for graduate students of clay science and technology. 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 project are evaluated. There is no restriction with regard to nationality. Deadline is April 1. Applications are available online at <http://cms.lanl.gov/research.html> or from the CMS office.

Thanks

Thank you to our contributors without whom our newsletter would not have been possible:

Rick Lahann
Dewey Moore
Victor Drits
Jay Shearer
Charles Roth
Javier Cuadros
Dougal McCarty
Jock Churchman
Peter Ryan

And especially to our
photographer, Carl Bowser

Donations Needed

The CMS headquarters office receives many requests from libraries and soil/earth science departments worldwide for donations of CMS books and other materials.

If you have purchased CMS publications in the past that you are no longer using, please consider donating them to the society for re-distribution to these libraries.

Marilyn and Sturges W. Bailey Distinguished Member Award

The Clay Minerals Society (CMS) is soliciting nominations for the Bailey Award. This highest honor of the CMS is awarded solely for scientific eminence in clay mineralogy (in the broadest sense) as evidenced primarily by publication of outstanding original scientific research. Service to clay mineralogy, teaching and administration are not considered. This award replaces the CMS's Distinguished Member Award: hence, previous members of the Distinguished Member Award are ineligible. (Visit the CMS website for a list of previous awardees.)

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 April 1, 2002, to the committee chair: Robert J. Pruett, IMERYS Pigments and Additives Group, P.O. Box 471, Sandersville, GA 31082-0471 USA. Telephone 478-553-5208; fax: 478-553-5460; b.pruett@imerys.com

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.

Jack Burst Receives Russian Recognition

Dr. John F. (Jack) Burst, Past President of The Clay Minerals Society has been awarded the Kapista (Nobel Laureate in Physics, 1978) medal of the Russian Academy of Natural Sciences, Moscow and has been elected to membership in that Academy. The Kapista medal was awarded for his seminal work in the discovery and interpretation of the diagenetic processes experienced by swelling clay lattices as they are buried deeper and deeper in sedimentary basins. This classic work, in effect, established the scientific discipline of subsurface, clay mineral diagenesis.

The Russian Academy of Natural Sciences was established in 1990, after the Communist Era, on the initiative of scientists of Russia representing academic and applied sciences. The mission of the academy is to serve the development of science, education and culture as an important condition of the economic and spiritual renaissance of Russia.

It includes over 1500 doctors of science and professors of leading scientific research organizations and higher educational institutions, authors of scientific discoveries and founders of scientific directions encompassing wide knowledge areas of natural and humanitarian sciences. Among the members of the Academy are several Nobel, Lenin, State Prize laureates as well as the current Russian President, Vladimir Putin.

Dr. Burst also received the Albert Einstein Medal of Honor, the highest award of the Academy's U.S. Branch, for developing a compaction model that relates the sequenced, three-stage, diagenetic clay mineral water loss, under the impress of burial pressure and temperature, to the migration of petroleum and the filling of petroleum reservoirs. This classic work was first published in the AAPG Bulletin, v. 53, 1969. It has received previous international recognition in meetings held in Madrid, Spain (1973), Strasbourg, France (1989) and Nottingham, England (1997).



Source Clays Repository Reopens and Available For Orders!

Cliff Johnston is pleased to report that the Source Clays Repository has now reopened in its new home at Purdue University. A big thanks goes out to everyone involved in helping the transition and move from its previous home at the University of Missouri.

Information about ordering the source clays can be obtained from the website <http://cms.lanl.gov> and following the links to the Source Clays Project.

The direct URL is: <http://www.agry.purdue.edu/cjohnston/sourceclays/index.html>.

The new address and contact for the repository is:

Source Clay Minerals Repository
Purdue University
1150 Lily Hall
Purdue University
West Lafayette, IN 47907-1150
Voice (765) 494 4258
FAX (765) 496 2926
E-mail: sourceclays@purdue.edu

Specific information about the status of an order, shipping, etc. can be directed to G.S. Premachandra (Prema) at sourceclays@purdue.edu or at the phone numbers listed above.

If you have any questions, please contact the curators:

Cliff Johnston clays@purdue.edu
Darrell Schulze dschulze@purdue.edu

Clay Mineralogists Meet in Boulder *(continued from page 1)*

Thomas Casadevall, Director of the Central Region of the USGS. In his presidential address, CMS president Blair Jones reminded us all that clay minerals are the "original nanomaterials", and that in a world increasingly aware of the role of such materials, the CMS needs to play an active role in shaping nanomaterial research and policy. He also drew our attention to the importance of clay mineralogy in the field of environmental chemistry while pointing out that research in environmental chemistry often ignores the important role of clays and other solid phases. Gerhard Lagaly of the Institute for Inorganic Chemistry of Christian-Albrechts-University and recipient of the 2002 Marilyn and Sturges W. Bailey Distinguished Member Award, lectured on principles governing aggregation of clay particles pertaining to artistic, industrial and environmental applications. Among other points, he noted that aggregates range from house-of-cards to face-to-face morphologies, and that pH and

water chemistry play influence the types of aggregates that form.

The second half of the Plenary session consisted of two more lectures, the first by Sridhar Komarneni of the Pennsylvania State University, recipient of the 2002 Marion L. and Chrystie M. Jackson Mid-Career Clay Scientist Award. He highlighted various aspects of his research on clay nanocomposites, particularly synthetic swelling micas developed for slow release of fertilizers and selective uptake of trace metals and radionuclides. The Plenary Session culminated with the 2002 George W. Brindley Lecture by David Bish of the Los Alamos National Lab, who discussed the inherent heterogeneity of clays, especially with respect to disorder as a function of particle size. He demonstrated that, in some cases, disorder increases with particle size in kaolins, but in other cases the opposite is true. He also reminded us that good crystals of clay "are only a dream". Also worthy of note is that Komarneni and Bish were both mentored by the scientists after whom their awards are named.

Monday's symposia included sessions on *Interaction of Microbes with Clay Minerals*, *Clay Chemistry and Structure*, and *Mineralogy and Petrology of Mudrocks*. All three symposia were adjourned at 3:20 to allow all to attend Victor Drits' Keynote Lecture in the *Symposium on Structure, Crystal Chemistry and Surface Reactivity of Environmental Minerals*. His lecture, entitled "Structure and Crystal Chemistry of Birnessite", presented data on the natural settings, mineralogical structures and unique sorption and redox properties of the phyllo-manganates buserite and birnessite. He highlighted the need for further detailed structural and crystallochemical refinements of these minerals, particularly in light of their potential uses in environmental and industrial fields. Monday's sessions closed with the Posters and Poster Reception and the *Clays and Clay Minerals* Editor's dinner. Tues-

day's symposia included continuations of those initiated the previous day, as well as sessions on *Computational and Experimental Chemistry of Nanomaterials in Aqueous Systems* and *Isotopic Tracing and Dating of Clay Mineral Processes in Diverse Crustal Environments*. The final day of symposia included *Applied Clay Science*, *Weathering, Soils and Diagenesis*, and *Clay Membrane Processes*. The symposia at this year's meeting clearly illustrate the wide range of topics studied by clay mineralogists.

An exciting new aspect to this year's meeting was the first Reynolds Cup, a contest developed to test our expertise at quantitative phase analysis of typical shale mineral assemblages. Hats off and three cheers to winner Reinhard Kleeburg of the Technical University-Bergakademie in Freiburg, Germany for his precise quantitative phase analysis of 3 unknown mineral powders. His main method of analysis was Reitveld analysis of XRD patterns. Second place went to Reiner Dohrmann of the Federal Institute for Geosciences and Natural Resources based in Hannover, Germany, who also applied Reitveld analysis as well as other methods including IR and DTA. Third place was a tie between Dennis Eberl of the US Geological Survey and Stephen Hillier of the Macaulay Institute of Scotland, both of whom used spray drying and quantitative XRD analysis. In all, 40 contestants requested samples and 15 returned results. Dougal McCarty discussed preparation of powdered mineral specimens, objectives, rules, and results, and deserves accolades as Reynolds Cup initiator and organizer. Bob Reynolds was unable to attend this year, and in his place Victor Drits presented the awards, which consisted of engraved plaques for first through third place as well as an actual cup for the winner in the style of the Stanley Cup of National Hockey League fame (but looking more like a mortar and pestle) that will presumably pass on to successive cup winners.



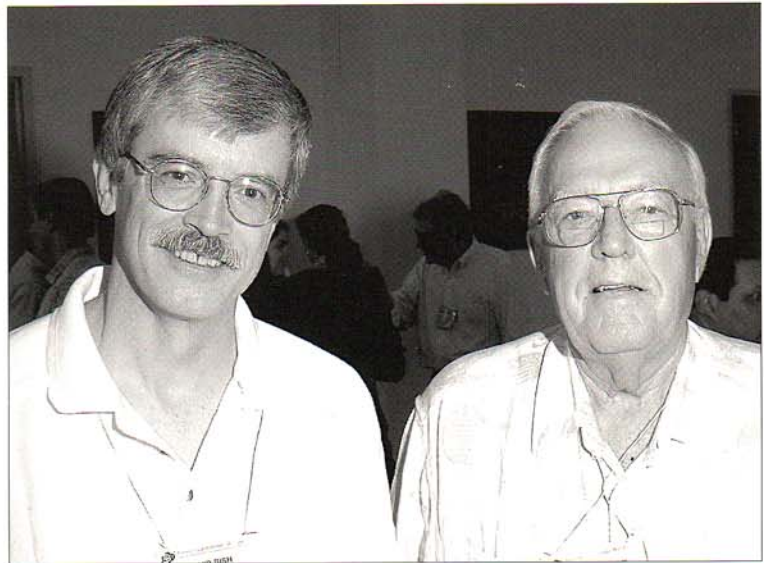
Left to right: Eric Daniels, Jean Hemzacek Laukant, Richard Brown



Blair Jones (left) and Gerhard Lagaly

The 2002 CMS banquet was memorable for many reasons. Awards and ceremonies included Society recognition for the hard work of the local organizing committee (K Nagy, D Eberl and A Blum), presentation of the plate by new president Jessica Elzea to outgoing president Blair Jones, and a special award of recognition for Jo Eberl, Society Office Manager from 1989-1999. Former CMS president Pat Costanzo presented the award, which consisted of a ceramic plate and an album of pictures and letters from appreciative society members. Pat also highlighted many of Jo's numerous contributions to the society, including initiation and development of the CMS News. Following the awards, clay mineralogists danced ... and danced and danced to the soul-jazz-funk of local favorites the Hazel Miller Band. Some even joined Hazel on stage for a rousing rendition of Johnny B. Goode!

The meeting concluded with a great field trip that combined approximately equal parts of geology, spectacular Front Range scenery, history, rock hounding and companionship. Participants spent the day touring local geologic sites including a clay mine, Dinosaur Ridge, Red Rocks, and an abandoned open pit gold mine where there were fantastic views of the Rockies and great opportunities to collect mineral specimens from tailings piles.



Dave Bish (left) and Haydn Murray



CMS members cut loose.



Denny Eberl interviews a rock.



Denny Eberl (left) and Paul Nadeau

More Highlights of the Clay Mineralogists Meeting in Boulder

(continued from page 5)



President Jones greets CMS members as his motorcade travels through Boulder.



Brij Sawhney (left) and Sridhar Komarneni



Left to right: Joseph Shi, Richard Brown, Haydn Murray, Wanda Allo



Steve Guggenheim (left) and Audrey Rule



Left to right: Laurie Underwood, Andy Thomas, Paul Schroeder, Leslie Shivers



Left to right: Jo Eberl, Victor Drits, Jan Srodon

Reims' 2002: Clays in Nuclear Waste Repositories

Submitted by Javier Cuadros, London, UK

The French National Agency for Radioactive Waste Management (ANDRA) organized the international meeting on Clays in Natural and Engineered Barriers for Radioactive Waste Confinement, held in Reims (France) December 9-12, 2002. The meeting is the first of its class, bringing together specialists from a wide range of different disciplines that are relevant to radioactive waste confinement in clay. Reims is the capital of the champagne-producing region, and the organizers made sure that the message came across – and the delegates were delighted to be “told”. Reims is also famous for being the place where the French monarchs were crowned – but, for some reason, there was not as much emphasis on this as there was on the champagne business.

The attendants were from 21 different countries, mainly European, but the US, Canada, and Australia were represented, as well as a sizeable contingent from Japan. There were about 400 delegates, a very appropriate number to facilitate discussions between sessions, and a relaxed atmosphere prevailed. 85 oral presenta-

tions and 144 posters were presented, distributed over 17 sessions covering geological, mineralogical, geochemical, geophysical and analytical aspects of radioactive waste confinement. Two sessions ran in parallel in adjacent rooms, which, together with their punctual progress, facilitated moving from one session to the other according to personal interest. The meeting rooms deserve to be mentioned because they were comfortable and outfitted with state-of-the-art facilities that did not fail during any of the speaker's presentations, and questions were always audible. There were three invited lecturers on the first morning, offering a wide perspective on the thermo-hydromechanical behaviour of clay barriers (A. Gens, Technical University of Catalonia, Spain); input generated by the “Clay Club” set up to share information and research results (M. Thury, NAGRA, Switzerland); and the role of clay in repository containment and strategy for performance investigation (P. Lebon, ANDRA, France). Lunch was provided within the conference venue, in a timely and tasty fashion. At the end of the conference, there was a

visit to the Underground Research Laboratory in Bure, Belgium, where tests are performed under “realistic conditions”.

The social program included the customary ice breaker, a chamber music concert (both of them held at the conference centre), and a conference dinner at the cellar of the Piper-Heidsieck champagne company. In the latter, the set-up was excellent and the delegates had the opportunity to taste different champagnes and to learn how to properly pair them with food. After dinner, there was a brief visit to the cellars.

The conference was a fantastic opportunity for researchers, engineers and agencies to learn about the progress of other studies, and discuss this work in a multidisciplinary forum. A strong focus was maintained throughout presentations and discussions on the ultimate application of the technology. The only set-back encountered was the cold weather (about freezing), though this was alleviated by the short distances between hotels, conference center and restaurant areas.

Clays & Clay Minerals Goes E-electronic!

Derek Bain, the Editor-in-Chief of the society's journal, *Clays and Clay Minerals*, is delighted to announce that *Clays and Clay Minerals* is now available online via the CMS website <http://cms.lanl.gov>.

In keeping with our move to electronic publication, authors are encouraged to submit manuscripts electronically as a single Adobe .pdf file (including text, references, tables, captions and figures) which should be e-mailed to the Editor-in-Chief (clayed@macaulay.ac.uk). Authors unable to send manuscripts as pdf files, however, can still submit hard copies in the usual way and these will be converted into pdf files in the Editorial Office for sending to reviewers. Use of pdf files will speed processing of manuscripts.

“Instructions for Contributors” can be found on the CMS web site: <http://cms.lanl.gov>

*From the Archives**Interview with a Clay Scientist ~ Dr. Fred J. Longstaffe*

The following is from an interview with Dr Fred J. Longstaffe, who is currently the Dean of Science at the University of Western Ontario, London, and also holds professorial appointments at Western in the Department of Earth Sciences, the Department of Chemistry, and the Department of Anthropology. This interview was conducted at the university in late 1998 and early 1999, by Dr. Karen Ziegler, who was a post-doctoral fellow with Dr. Longstaffe at the time. We, unfortunately, could include only excerpt highlights from the interview in the CMS newsletter, due to space restrictions. However, the full transcript of this interview is available from CMS, and if you would like a copy, please send email to ericdaniels@chevrontexaco.com.

CMS: To begin, tell us how you started in geology.

FJL: Well I never intended to go into geology. My ambition in high school was always to be a lawyer.

CMS: A lawyer?

FJL: "A lawyer??" ... everyone says that!

CMS: Very different fields, geology and law.

FJL: I went to a reasonably rigorous high school, and what I found was, when I reached the first year of university, that of all of the courses offered in first year university, I had taken almost all of them, already. So, they gave me some exemptions, but I still had to carry a full course-load. And one of the courses I decided to take was geology. The truth is I took geology because I had no idea what it was. It was one of those things on the list that I had never encountered before. So, that's how I started.

"I heard about these geology summer jobs, and ... I enjoyed it very much. I got to fly around in 'bush' planes and chop down trees and live in tents."

CMS: So, you weren't a child geologist who collected fossils and it wasn't your big dream to become a geologist from childhood?

FJL: No, never. I wanted to become a rich lawyer!

CMS: And now you're a poor geologist?

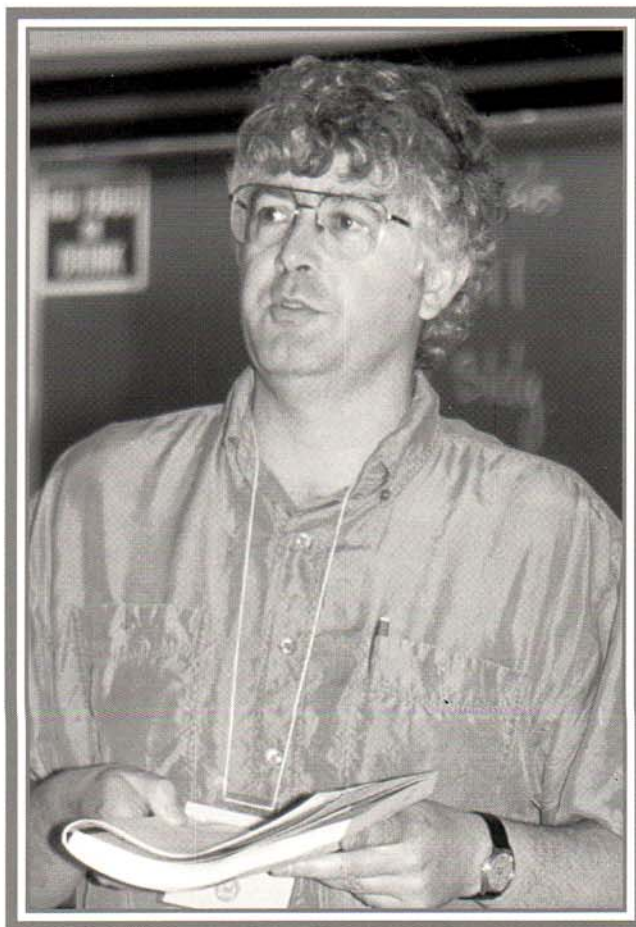
FJL: And now I'm a poor geologist!

So what happened was, during my first year of geology I had a very good geology professor named Bob Jull, who quite sadly was killed some years later in a helicopter crash, doing geology, along with several other geologists. But anyway, I had a very good first-year geology professor, and he convinced me that I should at least continue in geology for a few years.

CMS: Was that because you were so brilliant in geology, so clever?

FJL: I don't know if it was because I was so clever ... I think it was because he probably hated lawyers ... I'm not sure. [laughter] But he pointed out that, to get into law school in Canada, you had to have at least a couple of years of bachelor's degree education, anyway, and he suggested that I might as well stay in geology while I was reaching those minimum requirements. So I did, and towards the middle of my second year, I became aware that you could get jobs in the summer, and I had been working in a shoe store, which wasn't the most exciting...

CMS: So you would prefer going into the field for a geology summer job?



FJL: Yeah, so I heard about these geology summer jobs, and after finagling my way into my first one, I enjoyed it very much. I got to fly around in 'bush' planes and chop down trees and live in tents and drive motorboats and ...

But anyway I had a good job with the Ontario Geological Survey, and I enjoyed it a lot. So at the end of the second year, it came time to apply to law school, and I applied to law school, and I got in, but I enjoyed my summer job in geology so much that I asked if they minded if I stayed on one more year there, to complete a general

bachelor's degree. The law school said, "no, that would be fine," and so I stayed on one more year, had another good geology job, which I really enjoyed, again. And at the end of that year, it was suggested, well, now that I had finished a three-year general degree, why not get a four-years honor degree, so that I could always work as a professional geologist if law school didn't work out?! So I asked the law school, and they agreed, again, to let me stay on for another year. So I did, and one thing lead to another, and at the end of the fourth year there, when I had my honors degree, I was all set to go to law school, but instead I got married, and it occurred to me that there were no scholarships to go to law school, but there were scholarships to go to graduate school, and I had one of those, so I went to graduate school!

CMS: So, it was a coincidence that you ended up in geology.

FJL: Yeah.

CMS: Or, it wasn't planned.

FJL: There was no plan. There never has been a plan!

CMS: Have you ever regretted that?

FJL: Um ... occasionally, when I look at my line of credit debt load, I regret it, but other than that, no, not really.

CMS: So, then you went to graduate school?

FJL: Yeah

CMS: And that was in Hamilton?

FJL: Yes, there's a funny story about that, if you want to hear it ... do you want to hear it?

CMS: Yeah

FJL: Well, I had this scholarship to go to graduate school and a lot of people suggested to me that I should go to McMaster, in Hamilton. They said that there was a very good, famous professor there, named Denis Shaw, who worked in trace element geochemistry, and he would be a good person to go and work with. So I drove up to Hamilton, and I went to look for Denis Shaw, but he wasn't in. Instead, I ran into a young fellow in the hallway, named Bob McNutt, and he said, "what are you doing here?" And

I said, "well, I've come here to look to go to graduate school," and he said, "great! [laughter] ... come on in, I have a project for you!" [laughter] And so, that was how I ended up working on Archean crustal evolution.

A year later, or maybe it was six months later, after I was at McMaster, I was walking down the third-floor corridor – Dr. McNutt was on the fourth floor – I was walking down the third floor, and an RA pulled me into an office ... that turned out to be Henry Schwarcz, who said that he heard from McNutt that I was working on Archean crustal evolution, and asked me how would I like to do stable isotopes and Archean crustal evolution – and that way I ended up with two supervisors!

CMS: Did you know anything about stable isotopes before?

FJL: No actually, I didn't know what they were. [chuckles]

CMS: And you just agreed, not knowing what it was?

FJL: Yeah, well, you know, I mean, it seemed to me that if he was interested, that was a good sign, and that having your supervisor interested in what you're doing is important. McNutt was interested in Archean crustal evolution and Schwarcz seemed to be interested in stable isotopes, so I thought, you know, having two supervisors would be better than one, because if one wouldn't give you money to go to a meeting, or do something, then maybe the other one would [laughter] .. and that was more or less the way it worked!

CMS: And what did you do after your Ph.D.?

FJL: After my PhD degree, there were a number of options. I applied for some fellowships, and one of the fellowships that I applied for was something called a Killam post-doctoral fellowship, which comes out of a Canadian foundation. Killam post-doctoral fellowships are awarded, I think, at just a few universities in Canada. One of them was the University of Alberta, and the University of Alberta was the only other place at that time, in Canada,

that had an oxygen isotope extraction line for working on silicate minerals...

And so I arrived ... we arrived ... when did I arrive? ... in Edmonton on Christmas Day, 1977, with our two dogs, and I took up a post-doctoral fellowship there.

CMS: And what did you work on there?

FJL: Although I worked on Archean crustal evolution, one of the things that intrigued me the most were Archean meta-sedimentary rocks. I think I was intrigued by them, because almost nobody else was working on their geochemistry – everybody was working on granites, basalts, all those sorts of things, but not ...

CMS: So, you saw there was a gap there, where research needed to be done?

FJL: Yeah, I saw it as an opening where I wouldn't be tripping over too many people, basically, and so I became interested in clastic sedimentary rocks during my Ph.D. Because of that, and also because at McMaster, at the time that I was there, it was the heyday of the McMaster's school of clastic sedimentology, with the really big names, like Gerry Middleton, and Roger Walker. They held, once a month, a wine-and-cheese, no-holds-barred seminar, which would go on for hours and hours, where some poor unsuspecting graduate student would have to start talking about their thesis, and we would prepare an hour talk, and you wouldn't get more than two minutes into your talk before the questions would start, and you'd be at it for five hours. [all chuckle]. And so I went to all of these, initially for the wine and cheese, but ...

CMS: But that was only for the clastic sedimentology group, and you just went there as an outsider?

FJL: Well, you see, they were very liberal about that – anyone could come. But anyone that came would be subjected to the questioning presentation aspect of it at some time during the year. So I'd sort of had an

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Interview with a Clay Scientist ~ Dr. Fred J. Longstaffe

(continued from page 9)

informal education in clastic sedimentology that way. When I moved to Alberta, I was looking around for something to do, because I had almost had enough of Archean crustal evolution, and I was sitting in the middle of the Western Canada Sedimentary Basin, and I thought that there ought to be something that I could do with stable isotope geochemistry in the Western Canada Sedimentary Basin.

For my Killam post-doc with Karlis Muehlenbachs, I actually worked on the evolution of Paleozoic granites in Nova Scotia. Meanwhile, I was still thinking about what to do with clastic sedimentary rocks, and that was when I came across the paper by Savin and Epstein, 1970, on stable isotope geochemistry of clay minerals. It also turned out that in the department at Alberta at that time, there was a fellow named Jack Lerbekmo, who's still around and doing good work. Anyway, this was the late 70's and oil boom time, and the oil companies had just started to become interested in secondary porosity and this thing called diagenesis. Up to that point, it was thought that all the clay minerals you find in pores had to be detrital ... except for Jack Lerbekmo, who published papers – in I think 1953, and 1954, and 1958 – that pointed out a lot of these clay minerals were secondary.

CMS: Had you worked on clay minerals before, having been a Paleozoic and Precambrian-Archean person?

FJL: No, I had no clue about clay minerals.

CMS: So, you just decided you're going to go investigate the stable isotopes of clay minerals?

FJL: Well, it wasn't quite that simple. What happened was after I had been at Alberta for nine months, the department decided, in its wisdom, that it needed to hire a new faculty member in clay mineralogy [laughter].

I applied for this job as the clay mineralogist, and one by one, 'real' clay mineralogists came through the department to interview for this position – one of them was Denny Eber! [big laughter from all] ... I still remember that!

Denny came through at that time and I think they probably figured he was too smart for them ... he would make them all look bad or something like that. But anyway, I ended up with the job as the clay mineralogist, but I got it under ... well, I didn't get it under false pretenses – I did tell them that I knew absolutely nothing about clay mineralogy but that I was interested in applying stable isotopes to clay mineral problems in sedimentary basins.

I don't know if these things happen now, but there I was, hired, and the very first thing on my agenda was a meeting with the University President. Not a wine and cheese party, welcome to Alberta, rah rah rah, but an official formal meeting with the president of the University. So I went in to see the president of the University and he said to me "Well, what are you going to do?" I told him my idea. And he said, "I heard you don't know anything about that." [laughter] And I said, "no but I can learn", and he said "Well, here's \$10,000" and he handed me a check and he said "go and visit the best people you can find for the next six months and learn something about it before you start." I felt astounded by that...

CMS: So who did you go see? Who were the famous mineralogists at that time?

FJL: Well, the first thing I thought was that if I was going to work in Western Canada I ought to get to know the oil business and the famous clay mineralogists in Canada. It turned out that Tony Foscolos was at the Geological Survey at Canada in Calgary at that time, with a very nice laboratory for clay mineral work. So he graciously allowed me to spend a whole summer with him, learning all

his methods and techniques. I learned about X-ray diffraction and interpretation of X-ray diffraction patterns and how to prepare clays for that kind of work – clay mineralogy. And then I took a two-week short course offered out of SUNY, State University of New York. I think it was a continuing education course in X-ray diffraction techniques. And that was where I first met Bob Reynolds – I met him in a discotheque [laughter] on the first day.

CMS: You were dancing?

FJL: No, I was sitting at the bar.

CMS: What did he do?

FJL: Well, he was talking to me while I was sitting at the bar. And that is where I first met him. Of course I had no idea who he was, other than he was an instructor in the course. So I told him what I wanted to do, and he encouraged me a lot and it was a very intense but enjoyable two weeks. Then I arranged to go and spend time with John Hower, which I did, and that was a very, very insightful experience for me. I also met Ralph Grim at that time and I talked with him, and I also kept a little bit of money back and slightly later had the opportunity to spend some time with George Brindley. And so that's what I did with my \$10,000.

CMS: What did it teach you?

FJL: Well, what it taught me was that I'd better stick to application of stable isotopes to clay mineral because there was no way that I was ever going to catch up in the other areas with any of these people! But it gave me enough of an appreciation of what I getting myself into, to start. And during that time, I also met a few senior people in the oil company who were good enough to spend some time with me and say, "these are our reservoir problems, these are the things we're interested in, so why don't you find something along that line and we'll give you \$5,000 or \$10,000".

I told them about the possibility of starting up studies of diagenesis in

reservoirs using stable isotopes and they said "well that's an interesting idea if it works. Here's some reservoirs that we have. Why don't you try it out on those."

CMS: And that's how you really got started in the clay mineral isotope business.

FJL: Yeah, that was how I really started to get entrenched in it.

CMS: And clay minerals are still one of your big interests?

FJL: Yes, because there are so many different things – I guess a granite person would say, well, there's lots of different things to do in granite, if you think of them. But what I found was that with the combination of stable isotopes and clay minerals, there is such a wide range of things you can work on. It doesn't have to always be a diagenesis problem ... it can be an archeological problem or it can be a sedimentological problem, or it can be a ceramic problem, or it can be a problem in crystal chemistry.

CMS: In 1987 you left Alberta and moved to the University of Western Ontario, London. And when you got there, you had to build up your own lab again, build up your research group, all from the beginning again.

FJL: Yep, but I mean I got very fortunate when I came here. About a year after I got here, the University decided that they were going to build a new science building. And the Dean of Science at that time, Bill Fyfe, felt very strongly that I ought to get some laboratory facilities in that building. So, within two years I went from the cubbyhole that I started in here, to having a brand new laboratory and a brand new building.

CMS: Do you spend much time in the lab yourself, anymore?

FJL: No, no.

CMS: You spend more time being head of the department?

FJL: Generally, my time is most profitably spent in the laboratory having coffee at the round table. People start to get worried looks in their eyes if I'm actually going to touch anything [laughter]. But still, on occasion I serve a role and, for example, we had our BrF5 incident ... which I shouldn't really be talking about ...



CMS: One incident in how many years?

FJL: 21 years.

CMS: Well, that's good.

FJL: Yeah, when we had our one BrF5 incident, I was considered the most expendable. [laughter]

CMS: You were sent in to the room to shut everything down?

FJL: Yes, to go in and shut everything down. And so, my main job now in the laboratory is to make sure to write lots and lots of grant proposals, so that we have modern equipment and research funding so that research students and post-docs can have money to do their work.

CMS: What research projects are you involved in, currently, in your lab?

FJL: Well, as you know, we have a pretty large research group. One Ph.D. student, River, is doing on the clay mineralogy and stable isotope geochemistry of steam stimulation of oil sands. One of the things that I got into heavily in Alberta, that we still haven't published a lot on, was work on the Alberta oil sands, which are amongst the largest hydrocarbon deposits in the world. After I more or less completed the work that I wanted to do on conventional reservoir rock –

the business of large-scale movement of meteoric water through the sedimentary basin of Western Canada, and its control on diagenesis and all those sorts of things, I started to work in Western Canada on oil sands. That has a different set of problems ... you're looking at hydrocarbon recovery to a large extent, and hydrocarbon recovery which involves injecting steam into the ground. Of course the steam reacts with the clastic sediments

and produces a lot of interesting authigenic mineral assemblages.

We are still working on those now, using stable isotopes as a way of tracking how the injected steam moved through reservoirs, how hot it was when it hit different parts of reservoirs, which directions it moved in, all those kinds of things. So we are using the stable isotopes in the clay minerals as a petrophysical tool to learn about steam movement through reservoirs.

So that's one project, and it's quite interesting in terms of tracking changes in clay mineralogy and the isotopic composition of clays, as they

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interact with steam. We have a number of side-projects going with that at the same time, where we're looking at changes in the isotopic composition of injected fluids, to see what happens during steaming – how the fluids themselves change during rock-water interactions.

CMS: We heard in one of these past Clay Minerals Society newsletter issues that you've started getting sick of looking at the tetrahedral sheet of kaolinite, so what are you working on, apart from clay minerals? Do you have a project going on that is not related to clay minerals?

FJL: Yes, well there are a lot of projects like that. One of the more fascinating projects is looking at the oxygen and hydrogen isotope composition of opal phytoliths. Phytoliths are biogenic silica that's precipitated in living plants, and we've been extracting these phytoliths from North American native prairie grasses. We've been working on that for maybe four years, now – this is the Ph.D. work of Elizabeth Webb. We have been trying to understand how the oxygen and hydrogen isotope composition of these phytoliths relate to the isotopic composition of the water from which the plant grew, and the temperature and relative humidity at which the plant grew. These turn out to be complex systems because there is isotopic fractionation of waters within the plant, largely due to evapo-transpiration in the plant.

CMS: So, you related the oxygen and hydrogen isotope composition of phytoliths to that of the meteoric water?

FJL: Yes, our idea was that from the distribution of oxygen and hydrogen isotope compositions in these phytoliths, we would hopefully have a proxy that mimicked the oxygen and hydrogen isotope compositions of the local shallow groundwater and rain.

The idea, of course, is that meteoric water composition is linked to climate. And so if you want to go back through time, and you can find

proxies for the oxygen and hydrogen isotope compositions of meteoric water, then you have a proxy for climate. People have tried this with pedogenic clays, and so on, and we're basically trying to do the same thing with phytoliths. It's just that before we can do that with any confidence, we have to understand the living system. So, we're working on the living system, to get sort of a baseline.

So, this is all in the early days, and no one knows if it's going to work or not, but that's why they call it research!

So, what else are we working on? Do you want to hear some things about hydrogeology? ... Do clay mineralogists care about hydrogeology? [laughter]

“Stable isotopes are ... one of the most powerful tools for doing what people now call earth system science – looking at the interactions between the atmosphere, biosphere, hydrosphere, and lithosphere.”

CMS: Do you have cooperative projects between your geochemistry group and the hydrogeology group in your department?

FJL: Well, I would say those sorts of cooperative projects are just starting to begin. We have a new faculty member here, Rob Schincariol, who's a hydrogeologist and we have teamed up now to work on problems where stable isotopes are used to trace the sources of groundwater in ecologically sensitive areas. There are a number of provincial and national parks in Ontario, for example, where contamination of streams and reservoirs and marshes is of interest. We're actually able in places to track the movement of the marshwater into the ground water system, and the movement of the lakewater into the groundwater

system. And in this way, you can work out how rapidly the ground water system is exchanging with the marsh and the lake, on a scale of months.

This is important from some practical points of view, for example, if you want to understand contaminant transport into the marshes and so on. But there is also a link back to clays and soil water, and all these kinds of things – that by understanding how the groundwater regime can be very dynamic and changing in isotopic composition, it gives you a lot more insight into how you will interpret things like pedogenic clays, and carbonates in the paleo-soil record. If you're going to use those compositions as proxies for the kinds of things related to climate, you need to first of all understand how complex and dynamic the isotopic variability in the groundwater itself can be.

There's a whole lot more to be learned about how to interpret the stable isotope compositions of clay minerals and other phases that are forming in soil zones, or at the water table. At the water table, we need to know a lot more information not just about the clays and the carbonate and things that are forming, but also about the water in that system. And we need to know a whole lot more about how biology is affecting that – we need to understand about things that happen around root systems, and how plants change the reservoir of water that is in the unsaturated zone ... all of these things affect the isotopic composition of water that remains in that system, and therefore that of the pedogenic phases like clays and carbonates that form there.

CMS: So most of the projects seem to be applied to very specific problems in the environment, in geology. I understand you're also working with faculty in the Department of Anthropology?

FJL: Yes, that's a relatively new development.

CMS: It certainly sounds very different from geology and clay minerals.

FJL: Yes, well it happened that a former student of my former Ph.D. supervisor came to Western in the Department of Anthropology, a woman named Christine White. She works on the use of stable isotopes in archaeology, to solve all kinds of problems, ranging from migrations of ancient humans, to ancient breast-feeding practices, to sources of water, and all these kinds of things.

CMS: very different from kaolinite and illite!

FJL: Yes, it's very different than kaolinites and illites, but it still applies the same principles of using isotopic tracers. So, with Christine White and Kim Law, who is our technical assistant in these matters, we have been looking at carbon and nitrogen in collagen, which is basically the organic fraction of whatever we can get, either from bones, or from hair, or from fingernails – anyone who wants to be a lab standard, please step forward! [laughter] Looking at carbon and nitrogen in the collagen, and then looking at oxygen and carbon in bioapatite – looking at the oxygen from both the phosphate sites and the carbonate sites in the bioapatite – we've been trying to use these data in innovative ways.

For example, in a project that we've just finished, we were able to look at some ancient Mayan sites and determine from analysis of the dog and deer bones, how domesticated the dogs were, and whether certain doggies were being fattened up for ritual sacrifice or not. In another example, looking at some ancient Egyptian sites, we tried to determine whether oasis communities, which grew just C3 plants, were trading with communities further away on the Nile which had some C4 plants, and sort those kinds of things out. So, it keeps me ...

CMS: That's interesting ... it's interesting to see how you use the same techniques and the same methods, but are able to apply it to very different fields.

FJL: That's right ... there's some-

thing I really should never say in an interview, but I will anyway – I was told a long time ago by a friend of mine, Kurt Kyser, that stable isotopes were essentially the prostitutes of the profession [laughter]. And I asked him what he meant by that, and he said “well, they'll work on just about anything”. It is true that wherever there's carbon, oxygen, nitrogen, sulfur, or hydrogen, there are fractionations associated with changes in state – mineral reactions, organic reactions – and if you can understand what those changes are, and model them somehow, and then analyze them in ancient materials, you can work out what's happening. So, it's one of the most powerful tools for doing what people now call earth system science – looking at the interactions between the atmosphere, biosphere, hydrosphere, and lithosphere. And so that's where I've



situated myself ... of course, being involved with clay minerals has made that very easy for me because through the clay minerals society ... anyone who's involved with clay minerals is already used to working in a wide range of intellectual environments from chemists to agronomists, to geologists, to soil scientist, to so on, so you don't really have a great fear of stepping into somebody else's field and being squashed by them – because you've been doing it all your life, so you're used to being squashed by them [laughter] and then it doesn't upset you or bother you, you just get on with it and see if you can find out something new.

CMS: It must be interesting to see the many different applications for the techniques you are using.

FJL: Yes. When you have all these diverse fields coming at you, you very quickly realize how little you actually know.

CMS: Does that make you sit down and work even harder?

FJL: Well, it makes you sit down and read a lot, so that you know a little bit about everything, and perhaps not a lot about anything. But, you're also struck by the commonalities you find amongst the fields. I still remember, when I was at Alberta ... it still sticks in my head. I had a graduate student from the department of nutritional studies show up, with a problem on the “staling” of crumpets – I don't know if you know what crumpets are, but they're sort of like a funny-

looking pancake – and they were really concerned about the shelf-life of these crumpets [laughter] and how to determine whether, according to some food science standards, these things had gone stale or not.

CMS: So, you analyzed them?

FJL: Well, yes, indeed we did!

CMS: What isotope did you use?

FJL: Well, we didn't do any isotopes. We simply decided to develop a “crystallinity index” for crumpets [laughter], because staling, of course, is caused by starch. So, we extracted the starch

from crumpets, and developed a crystallinity index for crumpets – everything worked just great, it was wonderful! I thought that soon there would be an X-ray diffractometer in every bakery across Canada, and I would get all the royalties. Then, of course, I checked the literature and discovered that back in 1958, somebody else had been doing this on bread, for some time. [laughter] It's always nice to invent something and then discover it's already being done.

CMS: What was the conclusion of the crumpet study?

FJL: The conclusion of the crumpet

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study? The conclusion was that you could, in fact, determine whether a crumpet had gone stale, just by looking at the broadening of the main starch peak, and so you had a quantitative measure, not just a qualitative "taste" measure. The other conclusion was that all my graduate students at the time got fat, because you would only use one crumpet from all these packages of crumpets that kept pouring into the laboratory, and so they would eat the rest. So, the two main conclusions – overweight graduate students, and a quantitative index for the staling of crumpets. [laughter]

CMS: Do you have collaborations with people from outside of universities and outside of Canada?

FJL: Yes I do. I've been fortunate to work with a large number of people from around the world – some of the collaborations go

back almost twenty years, now. I should mention my good friend and colleague, Avner Ayalon at the Geological Survey of Israel. We have worked together for a long time on clay diagenesis kinds of problems, and looking at the origin and evolution of clays in sedimentary basins.

CMS: I would think it's a good experience for people to go to other places, to go abroad, seeing different systems, and not getting too focused on how things work in one's own place. What do you think about this?

FJL: Oh well, yes, absolutely. Because, you know, you can be in the worst place on earth, but if you don't know that you're in the worst place on earth, you may think it's wonderful. Or you may be at the best place on earth, and you don't know it, and you may just think everything is wrong with it. And there's really no way to deal with that unless you start to go to other places and see how things are done elsewhere, scientifically, and socially, and culturally. I think that

you just can't form judgments about the way the scientific or other parts of the world ought to be, unless you've experienced those things. Certainly for young scientists to travel to other laboratories and work with other groups, even for relatively short periods of time, I think is really important, and also extremely exciting for them. It's something that they should be encouraged to do.

It's also exciting for us, of course, to travel – right? I mean, you ask any geologist why did they go into geology, they'll tell you it was for the opportunity to travel. For me, it was the opportunity to fly around in a bush plane, paddle a canoe, and chop down trees. You know, it's just to do exciting things. And it's still the same – this

“So, we...developed a crystallinity index for crumpets... to determine whether ... they had gone stale or not – everything worked just great, it was wonderful! I thought that soon there would be an X-ray diffractometer in every bakery across Canada, and I would get all the royalties.”

summer I was in Kauai, with one of the graduate students of myself and Bill Fyfe, a fellow named Richard Léveillé, who's working on funny carbonates that grow in caves. So, it was absolutely essential that I go and supervise directly the sampling of the amorphous material and minerals – it couldn't have been done without me. [laughter] It's one of the real privileges and pleasures of the job, you know – you may end up working six or seven days a week, but if you can have a proper reason to go to places like Kauai, or the Sinai, or Sicily, or Corsica ... if you can get there as part of the work you do, that's worth a lot. Traveling and looking at rocks and soils, and waters, and minerals, and laboratories all around the world is something that I really enjoy ... and ought to do more of.

One of the nicest things that happens here, particularly with post-doctoral fellows, is that we get people in from Israel, or from Germany, or from France, from China, from Ireland,

and they bring with them knowledge and experience from those places and that gets transmitted to people here, even if the people here have yet to leave the country. They start to learn more about what goes on in other countries, in other places around the world. And, this often kindles their desire to go, themselves. So, I think it's really nice and valuable if you can keep a multinational group of people together in the lab, working on common problems. It's better than just having a bunch of people together whose only common interest is hockey. [laughter]

CMS: Do you have a favorite field of application?

FJL: Well, I think my favorite field of application is one that I haven't done

yet – I plan to drill a hole somewhere. As soon as I find the right spot, or the right money, I just want to drill a hole somewhere

where I can collect organic carbon, bones of ancient mammals, pedogenic clays and carbonates, and phytoliths – everything together in the same hole, through a zone of interesting potential climatic variation. And take all these bits and pieces of my research program on clays and phosphates and bones and organic matter – take all these pieces and put them together to do an integrated study of stable isotope proxies of paleoclimate, especially on continents. I think our laboratory is ready to do this now because we can analyze all these different things, and having worked with the soil water and the pedogenic clays and carbonates, we have some understanding of the various things that might happen. With the archaeological stuff, we're familiar with how to deal with bones and teeth and dental enamel, and with all those diagenetic effects that can affect their isotopic compositions, so I think that that's the thing that I would ...

CMS: So, is that a long-term goal?

FJL: Well, that's one of them.

CMS: What are your other goals?

FJL: Other goals?!

CMS: What would you like to do?

FJL: I'd like to take a year off [laughter] ... and travel. I'd like to go overseas, I'd like to spend some considerable amount of time in Europe. I don't know why.

CMS: To work there?

FJL: To be there. I'm one of these embarrassingly monolingual people. All of my second language consists of French learned off of cereal boxes in my youth. [laughter] And it's quite embarrassing not to be able to speak another language fluently, and I think the only way to do that is to go live somewhere else where you have to speak the language. My work with NATO gave me a genuine interest particularly in Europe. There's so many things to see and do there, and I feel like I haven't done them, and I want to do them. So, that's one of my goals – to quit and travel around Europe for awhile!

CMS: You haven't considered moving somewhere else, like to another continent or another country or, for example, working in the U.S.?

FJL: Nobody's asked [laughter] ... or at least not seriously.

CMS: Would it be of interest to you, or are you happy where you are right now?

FJL: Oh, I'm happy where I am, but one should never rule out any possibility, right? I was very happy in Alberta and I moved here.

CMS: Yeah.

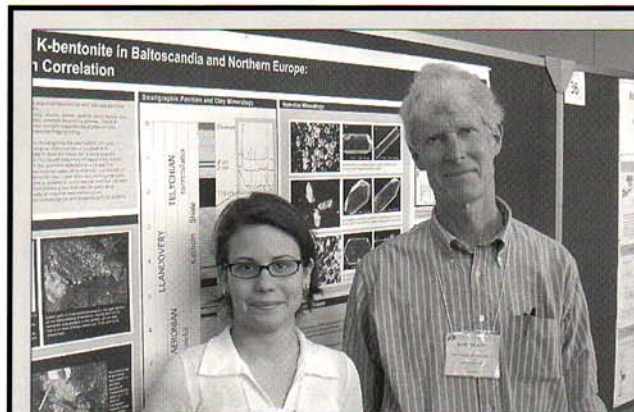
FJL: And so, this is not a veiled hunt for a new position. [laughter] It's just that I don't like to ever say no to some things. You know, if somebody said to me, "now, pack everything up, stop everything you're doing, and move to Europe", I'd say "no" because it would be completely irresponsible. We have a lot of equipment, and a lot of people doing a lot of interesting things here. But, if someone said to me, "well, you know, why don't you come over for six months" [laughter]...

CMS: It shouldn't be too difficult to find somebody who's willing to put you up for a while.

FJL: No I don't think it'd be difficult. It's a question of finding the time. I think one of the great tragedies of scientific life these days is that we're all living on our "time mortgage" – that we've all had to borrow time from things we'd like to do, to get the things done that we have to get done. And the in-basket seems to get higher and higher, and you have another basket where things are just there to stay forever [laughter], and the out-basket gets smaller and smaller. I know that just about everyone is under these kinds of pressures, and I admire those that, despite those pressures, just go off and do these other more social-cultural things, which I think are extremely important – I do intend to do them at some point.

CMS: But for now you want to stay in Canada?

FJL: For now, yeah.



Student Research Profile

Name: Funda Ozlem Toprak

Academic History: I graduated from the Department of Geological Engineering in Middle East Technical University, Turkey in 1999. I was admitted to Geology Department of University of Cincinnati in 2001, and since then I have been working on clays for my masters study.

Hometown: Ankara, Turkey

Thesis Advisor: Warren D. Huff
Department of Geology
University of Cincinnati

Research Topic: The Lower Silurian Osmundberg K-Bentonite: Potential For High-Resolution Chemostratigraphic Correlation

What Led to Your Interest in Clay Minerals? The complicated and mysterious structures of clays and extensive uses of them in industry were some of the reasons that led me to work on clays, but the most important factor was the extensive and fascinating studies done by my advisor over the years correlating bentonites all over the world using their clay mineralogy.

Other interests? I like traveling and visiting new places.

Future plans? I intend to do a Ph. D. in the same field, using clay mineralogy as an important tool for constructing regional distribution pattern of geological formations

Anything else you would like to share with CMS members? I think CMS is a very welcoming and friendly as well as a productive society. I am very happy to be a part of it.

Favorite clay? Kaolinite

Favorite Alternative Use of Clay? My favorite use of clay is as a face-hand mask to cleanse, exfoliate and condition the skin.

Recipe: Mix one tablespoon of clay (preferably montmorillonite) with two teaspoons of purified water, work mixture into a smooth and creamy consistency. Apply with fingers to spread evenly.

~ Feats of Clay ~



Congratulations to Rick Lahann and Paula Elmer who were recently married!

* * * * *

The Clay Minerals Society wishes to recognize the following students who were awarded Research grants: Christine Conrad, College of William and Mary (EXAHS analysis of Pb(II) sorption complexes formed on planar Al₂O₃ surfaces); Al Elser, Georgia State University (Weathering and Provenance of muscovite in Georgia kaolin deposits); Iosif Moravetz, University of Calgary (Identifying clay source microzones on St. Vincent, West Indies); Brian Nicklen, University of Cincinnati (Mineralogy, geochemistry, and stratigraphic correlation of Guadalupian bentonite beds, Permian Basin, West Texas and SE New Mexico); Jason Price, Michigan State University (Controls on rates of clay genesis in continental source area: Constraining temporal resolution of clay mineral assemblages as recorders of climate change); Funda Toprak, University of Cincinnati (Chemostratigraphic correlation of Lower Silurian Osmundsberg K-bentonite); Philip Walker, Stephen F. Austin State University (Effects of cation exchange capacity and interlamellar cation identity of smectite clays on visible spectra porphyrins). Congratulations to all!



Al Elser



Philip L. Walker, Jr.

* * * * *

At the Boulder meeting W. Crawford Elliot, Ray Ferrell Jr., Will Gates and David A. Laird were elected to council. Dewey Moore was named Vice President Elect and Richard Berry was elected to the office of Secretary.

CMS 2002 Meeting Student Presentation Awards

Congratulations to all of the student presenters at the Clay Minerals Society 2002 meeting! Our panel of student evaluators remarked on how impressed they were with the overall high quality of student's oral and poster presentations this year, and the consistently high quality efforts that were apparent in trying to get their points across in clear, concise, and readable presentation formats. Good job!

The Clay Minerals Society wishes to recognize the following students who were awarded top honors in oral and poster presentation categories at the 2002 CMS meeting:

Oral Presentations:

- #1 Tim Tambach, Department of Chemical Engineering, University of Amsterdam:
Simulating The Swelling of Montmorillonite
- #2 Liangxiong Li, Petroleum Recovery Research Center and Department of Materials Engineering, New Mexico Tech:
Solute Rejection Capabilities of Compacted Bentonite
- #3 J. Labille, Laboratoire Environnement et Mineralurgie, CNRS-INPL, Vandoeuvre-les-Nancy
Interactions of Microbial Polysaccharides With Aqueous Suspension of Montmorillonite

Poster Presentations:

- #1 Worth Cotton, III, Department of Geological Sciences, University of Colorado, Boulder
Clay Mineralogy of The Cerro Colorado Porphyry Copper Deposit, Northern Chile: Applications To Hydrometallurgy and Exploration For Hydrothermal Systems
- #2 Stefano Mazzoni, Department of Earth Sciences, University of California at Santa Cruz
Smectite Concentration and Fault Weakening Across The San Gregorio Fault Zone, Moss Beach, California
- #3 Brian Nicklen, Department of Geology, University of Cincinnati, Ohio
Clay Mineralogy and Stratigraphic Correlation of Some Middle To Late Guadalupian (Late Permian) Bentonite Beds, Cherry Canyon Formation, West Texas, U.S.A.

* * * * *

We also wish to recognize and congratulate the 5 students who received Student Travel Grants: Dana Derrington (University of Missouri Rolla), Megan Hart (University of Missouri Rolla), Peter Oduor (University of Missouri Rolla), Rosanna Saindon (University of Missouri Rolla), Andrew Tong (University of Sydney).

The Clay Doctor Has Returned!

The clay doctor has been absent from these pages for quite some time now, and I know many of us have been wondering what ever became of the good doctor. It turns out our beloved dispenser of sage advice has resurfaced, recently returned from an arduous adventure into the wilds and back again. Here is a brief synopsis of his tale:

The doctor went off two years ago to the jungles of central South America, in search of the legendary perfect smectite macro-crystal, rumored to be found in a dense swampy environment that only few non-natives had penetrated (and certainly, no clay scientists). Running quickly through the jungle while deep in a meditative state, the doctor was drawn from a mystical aura that radiated from the crystal. He felt that he was very close to the elusive treasure ... when suddenly he slipped, fell backwards, and lost consciousness. Unbeknownst to the doctor he had trotted right onto the slippery basal surface of the huge smectite crystal itself.

Several days later, the doctor awoke in the care of a native tribal group, but without any memory. The doctor spent many months with this friendly tribe, taking part in their society and learning many interesting things about their ways. These people were of a unique clay-subsistence culture, where many of their basic daily needs were met by the myriad uses of the extraordinary clay minerals around them, uses which they had passed down and elaborated upon through the generations. It was during one of the tribe's lunar convergence celebrations of their life-giving Mother Earth Clay – where they ingest a mixture of clay and brewed vines, to reveal to them nature's wisdom and fantastical images of their ancestor's spiritual world – that the clay doctor remembered his lost identity, and revealed to the tribe his true nature – a renowned clay doctor!

This revelation quickly elevated the doctor to shaman status in the eyes of the Clay People (as they referred to themselves) and thus began many months of clay-healing and growth, where he and elder tribespeople dispensed and shared their combined immense knowledge of the "ways of clay", derived from their respective western and native cultures.

Finally, when the clay doctor felt he had shared and learned much, he felt his birth-civilization calling him. He bid his new clay-mates a fond farewell, sharing his thoughts that he might one day return again, and began his arduous trek back out of the jungles and towards home. One month later, he arrived back home, slightly dazed, but feeling like he had experiences that cultivated his mind in ways that would yield immensely fertile ground for his future life work.

Rumors of the Clay Doctor's return had reached my editor's desk, and I called him on the phone to get a short interview about his experiences. Unfortunately, the doctor still seemed quite wiped out from his journeys, and although I had a long list of questions for him, the only response the doctor was willing to give me, in regard to his time spent with the Clay People, was the following:

Clay Doctor: All I can say is that it was great to be able to get clayed whenever I wanted.

And so there you have it, readers, more sage words from our very own Clay Doctor ... we can only hope that this marks a new beginning of regular contributions of wisdom and advice from our resourceful and knowledgeable colleague!



Unconfirmed photo of The Clay Doctor sent by anonymous photographer who snapped this shot during a clay healing ceremony.



Only confirmed photograph of The Clay Doctor.

Insights into Human Creativity and Discovery

Wayne Bundy, Past President of The Clay Minerals Society (1984-1985) and retired Vice President of Technology for the Georgia Kaolin Company, has recently published a book entitled "Innovation, Creativity, and Discovery in Modern Organizations" (Quorum Books, Westport, CT). This highly readable and intellectually stimulating work examines the culture of modern management and presents a new model for promoting innovation, discovery and leadership within organizations. Drawing on many historical resources, Bundy provides an insightful examination of the evolution of creative thinking and traces its role in human discovery. The book, which is written for laymen as well as scientists, challenges the established research management model based on conventional thinking and discusses ways to promote non-conventional thinking – the precursor to new discovery. Both a fascinating treatise on human creativity and a practical guide to stimulating scientific innovation, this book is relevant to scientists engaged in both academic and industrial research.

The Reynolds Cup Competition

- Submitted by Doug McCarty, Houston TX

The Reynolds Cup contest was created to test the ability of a variety of mineral quantification procedures to determine accurate mineral quantities in complex mineral mixtures that approximate typical sedimentary rock sample compositions. The contest was open to any commercial, industrial, and/or academic laboratory that was interested, and contestants could use any method or combination of methods they desired to obtain the most accurate mineral analysis they could achieve. The contest was designed to test both preparation and analysis techniques. The name Reynolds Cup was chosen in honor of Dr. Bob Reynolds for his inspiration and great contributions to quantitative clay science.

Out of 15 submitted results, the top six contestants had at least reasonably accurate results, and only the top two contestants obtained very accurate results. The organizers of the contest, Douglas McCarty and Jan Srodon, congratulate these top place contestants who did a fine job. However, the Reynolds Cup contest results also shows that accurate mineral quantification in complex mineral mixtures typically found in sedimentary rocks is not easy, and is probably unlikely from most commercial vendors who use standard low-cost state-of-the-practice methods. However, on the positive side, the competition demonstrates that accurate quantification is possible if the laboratory and analyst take the time and have the experience and techniques to do it right.

The organizers plan to have a second Reynolds Cup contest in two years, and expect that there will be a higher proportion of accurate results. This contest provides a way to help raise the standard of quantitative phase analysis for natural clay-bearing samples.



The Prize:

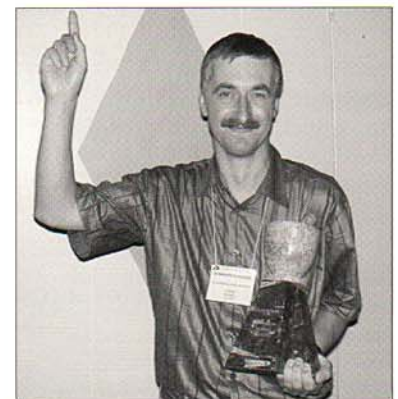
A photograph of the Reynolds Cup

The name Reynolds Cup was chosen in honor of Dr. Bob Reynolds for his inspiration and great contributions to quantitative clay science.



Top finishers in the Reynolds Cup contest.

Left to Right: Steve Hillier, Reinhard Kleeberg, Reiner Dohrman, Denny Eberl.



The winner of the Reynolds Cup - Reinhard Kleeberg, University of Mining and Technology, Mineralogical Institute, Freiberg. He used an internal standard and a Rietveld based method, along with a variety of supplemental techniques, for primary phase quantification.

June 26, 1931 - September 8, 2002

In Memory of Marion G. Reed

Marion G. Reed, an outstanding scientist and devoted colleague, brought a new dimension of science into the oilfield industry. Born and raised on a farm in Iowa, Marion decided that his future was in science and industry rather than farming. Marion spent two years in the Army. He took basic training in the infantry, but was transferred to military police in Germany when he was not playing football for the 7th Army team. Marion completed a B.S. degree in Soil Science in 1957 and a Ph.D. in Soil Chemistry in 1962, both from Iowa State University. In his Ph.D. research working with A. D. Scott, Marion studied the kinetics of interlayer potassium release from micas. In 1962, Dr. Reed joined Chevron's upstream oilfield research company in La Habra, California, becoming one of the first soil scientists to enter this industry. He spent his entire professional career of 30 years with Chevron, and he retired in 1992.

Marion quickly found a niche in the oilfield industry, applying his knowledge of clay mineralogy and clay chemistry to develop ways to prevent permeability reduction of oil-bearing rock due to dispersion of clays. One of Marion's early successes was the development of Claylok®, a chemical treatment that used hydroxyaluminum polymer solutions to prevent clay dispersion and formation damage. Marion has related stories of the early days at Chevron, dealing with the labile nature of hydroxyaluminum solutions when trying to make consistent barrel-sized batches of this material for pumping down oil wells. At some point, this job was made easier by the commercial availability of hydroxyaluminum solutions, which were being used in the deodorant industry. Marion applied clay stabilization technology to a number of problems in the oilfield and in civil engineering. For example, he worked with Norwegian scientists on the potential application of hydroxyaluminum to address soil and subsurface stabilization problems that can lead to disastrous landslides in Norway. He also conducted experiments showing that clay stabilizers could prevent roadways used to access oilfields in Indonesia from becoming unstable during rains. Chevron's first patent ever in the Soviet Union (in 1988) was one of Marion's clay stabilization patents. Marion also published many of his research findings in scientific journals.

During his career at Chevron, Marion also worked on the relationship between clay fabric and permeability of sandstones. He showed that the traditional methods of drying sandstone altered the fabric of authigenic clays in the pores. This alteration led to erroneously high permeability measurements compared with those on samples that had been critical-point dried with no high-energy air-water interface passing through the pore structure. Marion also spent considerable time leading the development of a non-invasive coring system for obtaining minimally-altered samples of oil-bearing rock from a formation. Rock cores are taken during drilling operations to assess properties of the rock such as oil saturation or permeability. Development of a system to minimize the alteration of the core involved design of coring fluids that would not alter the clays present if they permeated into the core. Also, the mechanical and dynamic aspects of the non-invasive coring bit itself were

designed to minimize the entry of fluids into the core. The mix of skills that Marion brought to this project went beyond clay mineralogy and clay chemistry, and demonstrated Marion's tremendous talents in terms of applied aspects of a problem.

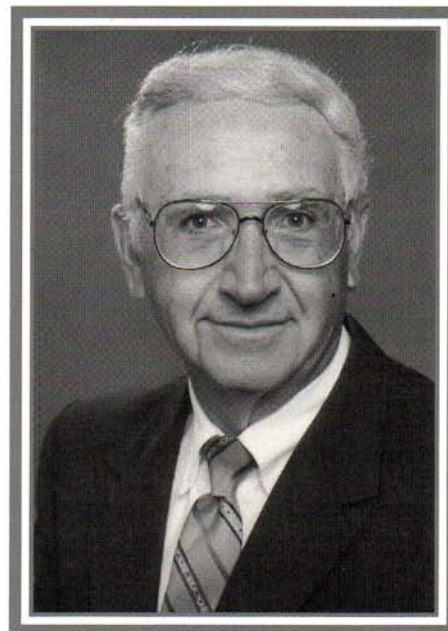
Because of his many novel contributions to the petroleum industry,

Marion was named a Society of Petroleum Engineers Distinguished Lecturer. The purpose of this program is to recognize the professional contributions of those selected and to disseminate technical information throughout the industry by outstanding, expert speakers. As part of this honorable lectureship, Marion and his wife Betty toured South America and Africa in 1992 and 1993.

Marion Reed found a professional home in the Clay Minerals Society, as he was a strong supporter. Among his many contributions to the Society, he served as President in 1985-1986. He also served as program co-chair (with Roger Burtner) for two Clay Minerals Society meetings – in 1989 in Sacramento and again in 1993 in San Diego. For those of us in the Society who had the great fortune to know or work with Marion Reed, we will remember that he was very methodical and meticulous in his approach to problems and issues. His viewpoints were always logically thought out. Marion very much enjoyed people, he was kind and easy going, and he had a great sense of humor.

Marion had a passion for life, and he particularly loved flying. After his two daughters were grown up, Marion and Betty spent many weekends with friends in their flying club, venturing in their single-engine airplanes to different places in the western United States and beyond, "camping" in the plane, and exploring the local areas on small motorcycles. He very much enjoyed his family, and was especially fortunate to be close to his two daughters, son-in-law, and five grandchildren in Southern California. He was a remarkable father and husband that will be missed greatly. Marion Reed will be remembered as a colleague who was an excellent representative of our field of science in the oil industry, and as a true and loyal friend.

~ Submitted by Dean Hesterberg



April 14, 1921 - September 18, 2002

In Memory of Boris B. Zvyagin

Boris Zvyagin, brilliant scientist and unique personality, was one of the leaders in structural mineralogy, crystallography and electron diffraction, as widely acknowledged by the international scientific community. It would not be an exaggeration to say that the modern level of our knowledge of crystal structures and crystal chemistry of layer minerals, including phyllosilicates and clay minerals, is, to a significant degree, the result of his fundamental research.

Boris Zvyagin was born on 14 April, 1921 in Nevel (Russia), into a poor Jewish family. The extraordinary abilities that he had shown at school allowed him to be admitted to Moscow State University without exams. He graduated from the University Physics Department in 1944 and then, at the Moscow Soil Institute, prepared a Ph.D. thesis on electron diffraction structure analysis of montmorillonite. After its successful defense in 1949, Boris worked at the All-Union Geological Institute in Leningrad as a senior scientist. In 1963, he became a Doctor of Science after defending his dissertation, "Electron diffraction analysis of clay mineral structures", at the Institute of Crystallography of the USSR Academy of Science. In the same year, he moved to Moscow to work at the Institute of Ore Mineralogy of the Russian Academy of Science, as the head of the High-Voltage Electron Diffraction laboratory, and then as a principal scientist. Since 1977, Zvyagin was a Professor of Crystallography and Mineralogy.

Boris Zvyagin was a pioneer in many theoretical and experimental aspects of structural mineralogy. He developed an original methodological approach to deduce systematically regular polytypes of kaolinite, chlorite, serpentine, mica, palygorskite, and other layer silicates. In particular, Boris was the first who discovered the peculiar features of talc-pyrophyllite polytypes and showed that talc has a one-layer triclinic structure and pyrophyllite occurs either as *2M* or *ITc* polytype. He successfully applied his

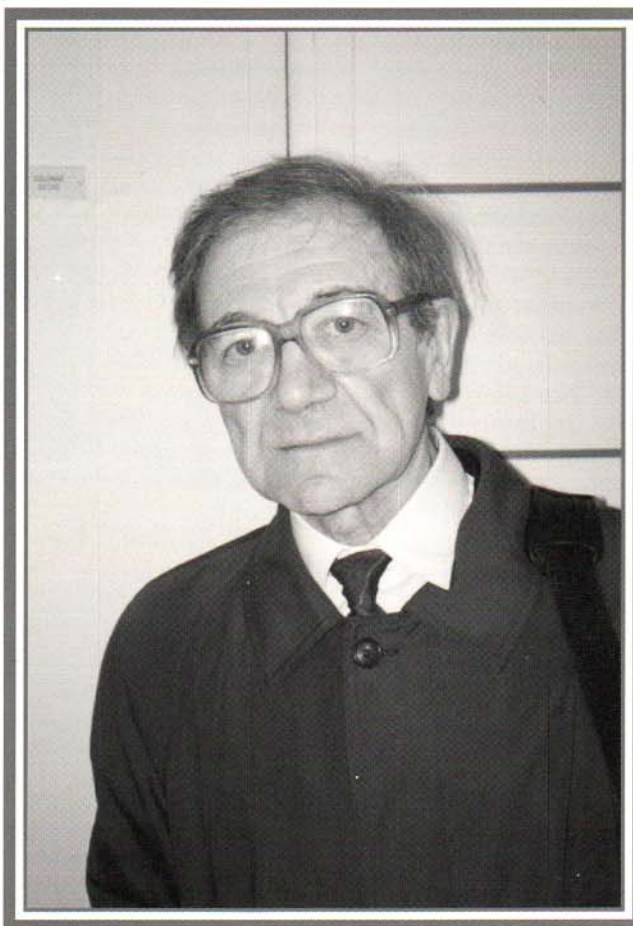
methodological approach to analyze polytype diversity not only of layer silicates, but also of various other layer and pseudo-layer minerals such as astrophyllite, chain-ribbon silicates and silicates with complex tetrahedral layers, oxyborates, graphite, sulfides, high-temperature superconductors, etc.

The symbolic notation that Zvyagin proposed for the description of polytypes is very reasonable and effective. Comparing their approaches, Bailey noted that Zvyagin's system is "a more complex but more precise analytical scheme of symbols to describe the resulting structure".

Boris Zvyagin was a pioneer in the comprehensive structural study of layer minerals by electron diffraction. In fact, he was the first who worked out and successfully used oblique texture electron diffraction (OTED) as an independent and powerful tool for structural analysis of layer minerals. This was complex work. OTED patterns differ dramatically from those obtained by X-ray diffraction. One of the main problems was to interpret OTED patterns observed for various clay minerals. Zvyagin showed

that texture patterns are especially suitable for the study of phyllosilicates and clay minerals, and developed simple diffraction criteria for their unambiguous identification. Thanks to a deep understanding of relationships between structural and diffraction features of different polytypes, Boris discovered structural peculiarities of many minerals that were poorly studied at that time, including two-layer halloysite, lizardite- $2H_1$, *cis*-vacant 1M illite, $2M_2$ dioctahedral mica, triclinic cookeite, copper- and zinc-bearing clay minerals, molybdenites, graphites, iron oxides and hydroxides, as well as layer silicates with complex or unusual structures, for example, ferripyrophyllite and hydroferripyrophyllite, 4M Ti- biotite, six-layer Unst-type serpentine, chapmanite and bismuthoferrite.

In 1957, using the OTED technique, Boris Zvyagin for the first time refined the crystal structures of the clay minerals, kaolinite and celadonite. This was a remarkable



result. At that time, most crystallographers believed that electron diffraction could not be used for structural analysis because of dynamic effects, and the only way to refine a crystal structure was by single crystal X-ray analysis. Since 1957, Boris and his colleagues refined numerous layer silicate structures (nacrite, different polytypes of muscovite, phengite, paragonite, biotite, etc.).

One of Boris's main activities was development of electron diffractometry, which allowed a considerable increase in the accuracy of intensity measurements, thus providing a new level in the structural analysis of minerals. In particular, this methodology was used to determine the positions and bonding of protons in brucite and 1T lizardite.

For the last decade, Boris concentrated his attention on the development of modular analysis of crystal structures. He proposed analytical means for the consideration, description, and derivation of modular structures, which included, as components, polymorphism, polytypism and the theory of OD structures. This is a new scientific domain in modern structural mineralogy, and he was a leader. In particular, he developed fundamental generalizations of modular systems for biopyriboles, sapphirines, ferrites, spinelloids, and also for the system of complex reyerite-gyrolite-fedorite-type silicates. One of his last papers was devoted to the analysis of the nomenclature of micas in terms of modular crystallography.

Boris was an active and creative scientist. He was an author and co-author of 400 publications concerning theoretical aspects of electron diffraction, polytypism and polymorphism, modular crystallography, as well as on the structure and crystal chemistry of layer silicates, clay minerals, and other minerals with layer and pseudo-layer structures.

Under Zvyagin's supervision, ten PhD theses were successfully prepared and defended. Later, three of these PhDs defended DSc dissertations.

For outstanding contributions in crystallography and structural mineralogy of layer silicates, Boris Zvyagin was awarded the highest honor presented by the Russian Academy of Sciences for Crystallographers, the Fedorov Gold Medal Award. He was also awarded the Vainshtein Award for Electron Crystallography. In 2000, Boris Zvyagin received a most prestigious award from the Clay Minerals Society – CMS conferred upon him the Marilyn and Sturges Bailey Distinguished Member award.

Boris was one of my closest friends, and I always kept admiring his extraordinary and powerful personality. He had a passion for life in all its aspects. Every scientific problem that he tackled, he approached with striking enthusiasm and ardor. He was a fantastic expert in music – he loved all kinds of music but most of all classical music, in which he was an acknowledged authority among professionals. Boris was a wonderful husband and a unique father and grandfather. He had dozens of friends, and his loyalty to friends and friendship adorned his life and the lives of his friends. To say that his friends and family will miss him is to say nothing. Without Boris, our world will not be as rich and varied as it was before.

~ Submitted by Victor A. Drits

Member Survey to Be Launched

The Clay Minerals Society wants to know how to better serve its members. You can help provide valuable input by completing a member survey that will soon be sent to all active members.

The goal of the survey will be to discover what you want from the society and what is important to you. We will specifically request your opinion regarding many aspects of the society including the journal, newsletter, society leadership, website and the value of CMS to you as a scientist and professional.

This study is part of an ongoing effort and a renewed commitment to making the CMS the premier professional organization for clay scientists. Please help us continue to improve the value of the society by returning the survey.

Long Range Planning Efforts Continue

Recently, the Executive Committee has engaged in a series of long range planning meetings. The goal of these meetings is to draft a strategic plan that will be used to guide the society in making decisions about allocating our limited human and monetary resources.

As with many non-profit organizations, we have to make difficult choices as our revenues shrink from declining membership and limited returns on our investments. Income is used to support important society activities such as student research grants, the publication of Clays and Clay Minerals and the society office. In the face of these economic realities the society leadership is working to set goals that will insure the society's financial health in the future while serving our membership and our profession. This planning effort will also establish continuity in society leadership.

Website Makeover

Be on the look out for a new Clay Minerals Society Website! We are pleased to announce that the new site will be on line in June. Many thanks to the members of our Website Committee: Ray Ferrell (Chair), Dave Bish, Worth Cotton, Leslie Shivers, Andy Thomas and Kevin Murphy who are working hard on this project.

Award Nominations Now Due

Nominations for the Marion L. and Chrystie M. Jackson Mid-Career Clay Scientist Award and the George W. Brindley Lecture are now due. Please send your nomination materials to the Society Office. For more information visit the CMS website at <http://cms.lanl.gov> or call the office at 303-680-9002.

November 30, 1914 - December 21, 2002

In Memory of M.L. Jackson

It is with a sad heart that we report the passing of Dr. M. L. Jackson. He died on December 21, 2002, at the age of 88 in Madison, WI. The following announcement appeared in the Madison newspaper:

Dr. Marion L. Jackson, emeritus professor of Soil Science, University of Wisconsin-Madison, died on December 21, 2002, at age 88.

He was born in Reynolds, Nebraska on November 30, 1914. He attended the University of Nebraska-Lincoln, earning his B. S. in 1936 graduating Suma Cum Laude with High Distinction, and receiving his M. S. in 1937. He was granted the Ph.D. in Soil Science at the University of Wisconsin in 1939. In 1974 he was selected Franklin Hiram King Distinguished Professor. He was awarded an honorary Doctor of Science degree in 1974 from the



University of Nebraska. He was conferred the Distinguished Career Award of the Soil Science Society in 1986 and the Bouyoucos Soil Science Distinguished Career Award in 1986. In 1987 Professor Jackson was elected to the National Academy of Sciences.

Marion married his sweetheart Chrystie Marie Bertramson on September 2, 1937, in Potter, Nebraska.

Through his research Professor Jackson, in the decade

1944-54, carried out extensive field experiments using a combination of liming with high rates of fertilization with phosphate and potassium. Corn yields were raised from a statewide average of 44 to over 100 bushels per acre. He developed the leading weathering sequence for clay minerals and a widely used set of methods for soil mineral analysis. He made many other contributions to the understanding of soil minerals, their chemical properties, and their roles in the environment. His scientific contributions are documented in 241 scientific publications including two books, *Soil Chemical Analysis* and *Soil Chemical Analysis - Advanced Course* and 14 chapters in other books on soil chemistry, soil mineralogy, and other topics.

By 1956 Dr. Jackson was well known nationally and internationally. He gave many distinguished lectures at scientific meetings including the Pioneer in Clay Science Lecture and the George W. Brindley Lecture for the Clay Minerals Society. He addressed the National Academy Sinica in Nanking and Peking, China, and the European Academy of Sciences and Medicine in West Germany. The latter lecture was on the geochemistry of elements as related to health. A significant contribution of studies with China were on the benefits of selenium to health. He was visiting professor at Cornell University in 1959 and distinguished visiting professor at the University of

Washington-Seattle in 1973. Also, he was a panel member on disposition of radioactive wastes for the National Academy of Sciences 1976-1977.

Professor Jackson trained 59 Ph.D. students and 18 M.S. students who occupy numerous positions of importance in clay and soil science in industry and in academia. Also, he advised 37 postdoctoral scholars from countries around the world who now hold key university positions. Dr. Jackson also served as external reviewer of PhD. theses from Australia, New Zealand, S. Africa, Egypt and India.

Dr. Jackson was a member of the American Society of Agronomy, the Soil Science Society of America (president, 1967-68), the International Society of Soil Science, the Clay Mineral Society (president, 1966-67), the International Clay Mineral Society, the Mineralogical Society of America, the American Association for the Advancement of Science, and the Environmental Geochemistry and Health Society.

Basic research activities have led to listing in Who's Who in the World, Who's Who in Frontiers of Science and Technology, Leaders in American Science, World Directory of Mineralogists, and the National Register of Scientific and Technical Personnel. Dr. Jackson was a Fellow in the American Association for the Advancement of Science, the Soil Science Society, the American Society of Agronomy, and the Mineralogical Society of America.

A Soil Science Award Fund was established by Marion and Chrystie Jackson for mid-career soil chemists recognizing contributions of excellence in the soil science and related fields.

Professor Jackson is survived by his wife, Chrystie (Bertramson) Jackson, and three children: Marjorie Jackson of Omaha, NE, Ginny, V. L. (Bruce) Conlon of Dallas, Tx and Stan Jackson (Beth) of Fairfax, Va., and daughter-in-law, Lorrie Leja Jackson, Cheboygan, Mi. His son Douglas M. Jackson, M. D. predeceased him. He is also survived by seven grandchildren: Daniel and Thomas Conlon, David Jackson, Angela (Jackson) Michaels, Andrew, Becky and Christopher Jackson; and two great grandchildren: Joseph and Peter Michaels.

~ Submitted by Charles B. Roth, West Lafayette, Indiana



Marion and Chrystie Jackson (center) with first 4 recipients of the Marion L and Chrystie M. Jackson Mid-Career Clay Scientist Award. Left to right: Jan Srodon, Joe Stucki, Steve Guggenheim, Dave Bish.

August 12, 1948 - October 23, 2001

In Memory of Mark Peter DiStefano

Mark was born in Rochester, NY, to Dr. Victor and Mrs. Shirley DiStefano, of Scottsville, NY, the oldest of 5 children. Entering Knox College in 1966, this tall, slender young man delighted in focusing on obtuse aspects of the task at hand. When other geology majors were feverishly studying for tests, Mark might be found playing in his band, or holed up in the department darkroom for the better part of a night, or rebuilding his motorcycle in his dorm room, or on a rock-climbing trip with his confederates. Later in life, Mark would sometimes speak wistfully of his days as a bass player in a band.

Mark's native intelligence carried him through Knox College. His keen insight was most evident in conversations or in questions after an invited speaker had finished. At Knox, from which he graduated in 1970, he was part of a tightly knit group of friends whose relations remained strong throughout Mark's life. Some faculty considered him shy; those who knew him better realized that he was sometimes quiet so his well-developed cynicism wouldn't show. After his PhD thesis had been accepted he wrote, "It seems like you have to sell out in one way or another to get anything done (2/14/79)."

Mark probably would have preferred going straight from high school to graduate school where he had the opportunity for uninterrupted focus on the things that interested him, which were mostly analytical gadgets. We don't think he ever met a gizmo (or car or truck or camera) he didn't like. He could ask of them, and receive, far more than most lab jockeys. He earned a Masters degree in geology from Northern Illinois University in 1973 under the guidance of Ed Odom. He later earned a PhD from Texas A&M in 1978 working with Tom Tieh. At both, he was, in his own words, "the resident wizard."

With degree in hand, Mark went to work for Phillips Petroleum in Bartlesville, OK, where he developed a fascination with and insight into well-logging tools. He quickly developed a reputation as the go-to person for questions about the relation between clay minerals and log response, and almost all other aspects of log instrumentation and borehole environments. He had a number of publications and two patents related to log analysis. Well logs were yet another gadget for Mark to figure out, with the added attraction that they functioned several thousand feet into the subsurface and at the end of a very long cable attached to a complex array of instruments and a large truck.

In 1981, Mark moved to Ponca City, OK, and into Conoco's Exploration R&D. Mark would probably consider his crowning achievement at Conoco the drilling of a logging test well, Conoco 33-1. This well was continuously cored from surface to TD and characterized by standard and experimental well logs from several companies. Mark spent hundreds of hours coordinating the logging companies' activities and generally being part of all the drilling activities. He loved every minute of it.

From 1992 until the time of his death, Mark was employed by IT Corporation (now Shaw Environmental and Infrastructure) as a Senior Environmental Geologist. He served in this capacity at their offices in Lake Charles, LA,

Las Vegas, NV, and Baton Rouge, LA. Mark supervised, mentored, and collaborated with many scientists at Conoco R&D and later at IT. He encouraged creative work, independent thinking, and constructive criticism.

Mark served The Clay Mineral Society in a number of ways, among them were:

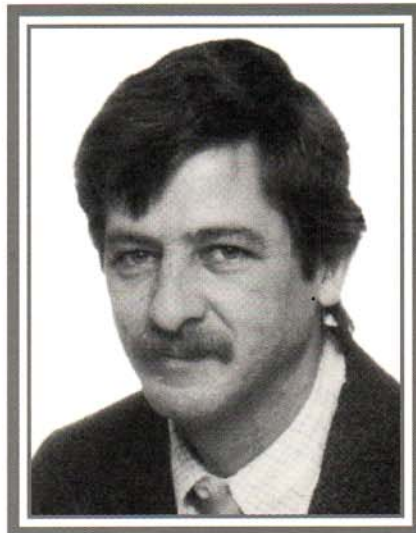
the membership committee from 1979 through 1985, serving as Chair part of this time; the nominations committee 1988 to 1990; and as a Council member from 1986 through 1988. At the 1985 CMS annual meeting, Mark gave the introductory lecture to the workshop, "Clays and Log Analysis."

On a personal note, Mark met Melanie Budd in 1971 while they were both students at Northern Illinois University. Their son Clay DiStefano was born in 1983. They were divorced in 1991. Mark was a hands-on guy at home as well as at work. He cut down an oak tree at his house in Ponca City, sawed the log into boards and built a beautiful desk. He also could be playful. At an Organic Geochemistry seminar, Mark won a swimsuit contest by borrowing a woman's swimming suit (he was the only contestant). An evening at the DiStefano home often involved a game of "King Oil," a game of intuitive calculation of risk and interpretation of 'subsurface' trends. Mark and his son Clay shared many interests and hobbies. They loved anything with an engine, preferably diesel. Other interests they shared included computers, carpentry, model airplanes, fishing, and visiting Mark's family in New York. Clay continues his education studying Automotive Technology and Pre-engineering at Arapahoe Community College in Denver where his mother heads the Interior Design Department.

Those of us who knew Mark will remember the child-like joy he derived from using a gadget to answer a question and the enthusiasm he brought to his work and to his play. We will also remember his cynical sense of humor that helped us all deal with the complications of life. He was a loyal friend. We have missed him and will continue to do so.

Mark is survived, in addition to his son, by four siblings: sister Lynne Skivington of Scottsville, NY; brothers Paul DiStefano of Rochester, NY; Peter DiStefano of Boston, MA; John DiStefano of Scottsville, NY; and many nieces and nephews.

~ Richard W. Lahann, Duane M. Moore and Jay N. Shearer



Clay Minerals Commentary

The Future of Clay Minerals Research

Submitted by Jock Churchman

Recently, the managers of CSIRO Land and Water killed off the largest and oldest lab doing research on clays and clay mineralogy in Australia. This lab was the successor of the Mineralogy Section of CSIRO Division of Soils (which merged with CSIRO Division of Water Resources to form CSIRO Land and Water a few years ago). The lab has been one of the major centers of clay research in the world for more than 50 years. It is the lab in which Keith Norrish did his pioneering work on the chemistry and mineralogy of micas and on clay swelling and much else besides in mineralogy and X-ray studies. It is also the lab where Ted Radoslovich developed the idea of rotations of silica tetrahedra to explain how kaolinites can have a flat morphology when there is an inherent mismatch between octahedral and tetrahedral sheets. In this lab, Reg Taylor developed world-class expertise on iron oxides and Reg McKenzie likewise on manganese oxides, and it is here that Phil Slade has done so much careful and pioneering work on the structures of clay-organic complexes. This lab has a collection of clay mineral samples that may be unmatched anywhere. Nonetheless, it is to be closed down as a research facility.

I write this to alert the rest of the clay world to this unfortunate fact. However, I also write because I think this is another sad example of the demise of centers of excellence in clay mineralogy world-wide. I think an occasion like this is one where we should all take time to reflect on the state of our discipline and the reasons for its apparent decline.

In the particular situation in CSIRO Land and Water, the reasons given for the closing of this area of research are quite clear. Simply speaking, clay research did not bring in enough money from clients. Other areas of land and (especially) water research are much more lucrative in that regard in this country.

Of course, this explanation begs the question of why this particular criterion should be the paramount consideration for the worth of a discipline. It is a fact that it is so. And, of course, it is also the

case in research institutes in much of the rest of the world (though perhaps not in France – vive la France!). I think it typifies the general situation almost world-wide where science is now valued only for the monetary gain it can bring – and the sooner the better. Science is seen historically as having been successful in producing worthwhile products. The hen of scientific research has certainly laid some large shiny golden eggs. Now all (society, managers, even scientists themselves, while justifying support) have become so focused on those eggs that they have forgotten quite a few aspects of how they got there. For example, it has been forgotten that the hen sometimes lays some duds or does not lay at all for periods of time. It has also been forgotten that the eggs that have been produced have often been quite different from those that were expected. The research hen has produced many serendipitous eggs that have proven to be more valuable than the regular products, when and if they were seen for their true worth. What is worse, everyone has become so focused on the apparently inevitable golden eggs that they have forgotten to feed the poor hen and especially to give it encouragement. To bring this back to reality, applied science and technology have come to be favored at the expense of basic understanding and new science.

And this is why clay research is missing out for support. Apart from the rare situations where geophagy occurs, you can't sell clays for their nutritional value, nor do they have beauty or rarity to give them value. They are not a "problem", like heavy metals or pesticides, although they may help to deal with these problems. Even then, however, they probably have no magical characteristics to give them great value for these applications. In many ways, clays are undervalued because they are everywhere. Yet the fact that they are everywhere – in all soils, in enough deposits to make pottery universal and enable paper to be filled and coated everywhere and to provide all of the world's pets with litter, means that they are of priceless value. Their occurrence in

soils alone means that life on earth is possible. Otherwise, plants would not acquire nutrients and water to provide food for animals, etc. Still, they are generally taken for granted and, as a result, we cannot get (enough) grants to study them.

It seems that many believe that we can get by without extending and deepening of our understanding of these most useful materials. For example, it is commonly believed that we can confine our (environmental) studies to more superficial and specific topics. If a soil science department or an environmental research institute needs to cut staff, it is those at the basic understanding end who suffer. They will not be able to provide the instant solutions, so they will not be able to find clients to support their work. The outcomes from the basic work are of value in the long-term – maybe decades, but not in the one or two years demanded by industrial and regulatory interests.

In the Australian situation, it has been the move towards organization of research along outcome, client-oriented, lines that has killed off clay research. Financial targets have been set and scientists have had to align themselves with groups that approach particular problems. Our group has been aligned most recently with remediation research. This turned out to be a poor gamble. There has not been enough promise in the application of clays in remediation research to enable us to gain approximately 60% of our salaries, and the target is rising. We may have been able to earn more through assisting others in a variety of topics e.g. carbon sequestration or water treatment, as well, but we would still be limited by the short time-lines that argue against research aimed at understanding. Still, all of that is water under the bridge for us.

The main point I have arrived at in these musings is to warn my clay mineralogical colleagues elsewhere to be very wary of the organization of scientific research along problem-based lines. Institutes that are organized in this way are no place for real clay mineralogical research.

The Clay Minerals Society

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Society Office Advisor

H. H. Murray

* *ex officio*

** *ex officio, non-voting*

† *non-voting*

The Clay Minerals Society

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publisher of clays and clay minerals

Purpose

To stimulate research and to disseminate information relating to all aspects of clay science and technology.

Services

- Sponsoring the annual Clay Minerals Conference where papers and specially-invited reviews are presented in all areas of clay science.
- Organizing trips to laboratories, industrial plants, and field occurrences of clays.
- Supporting a Student Research Grant Program.
- Arranging joint meetings with other related societies.
- For North American members, joint membership in AIPEA, the international clay organization.
- Publishing the CMS Workshop Lectures Series and occasional Special Publications.
- Offering selected books to its members from time to time at a discount over the publisher's posted price.
- Member discounts on publications of the Mineralogical Society of America.
- Supporting the Source Clays Project which is designed to provide homogeneous clay samples for research purposes.
- Publishing the bimonthly journal *Clays and Clay Minerals*, and a newsletter containing information about Society activities, related conferences, and non-technical articles of interest to the clay science community.

Benefits

Through access to its conferences and publications, membership in the Society is the best way to follow the many-sided developments in the clay sciences and to meet fellow scientists and technologists having widely different backgrounds and interests.

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Phone (Please include country code outside of North America) _____

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Subscribing Member*	\$70.00 _____	For calendar year(s): _____ through _____
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Non-subscribing Member	\$35.00 _____	

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****Student applications must be countersigned by student's advisor.**

Please make checks payable to *The Clay Minerals Society*. Checks must be in U.S. dollars and drawn on a U.S. bank. Visa, Discover, MasterCard or American Express may also be used. Please include card number and expiration date.

Georgia Center Conference Registration Form

Classic Clays & Minerals (#50594)

Please FAX to: (706) 542-6596 or (800) 884-1419 - Credit card only
OR mail to: Attn: Conference Registration, Room 129
Georgia Center for Continuing Education- The University of Georgia
Athens, GA 30602-3603

(name - please print or type)

(preferred name for name badge)

(social security no. *)

(business mailing address or check here if home address)

(city)

(state)

(zip)

(county, if Georgia)

(home phone)

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(e-mail address)

(position)

(organization/employer)

*SSN is used to confirm name for retrieval of transcript.

CONFERENCE REGISTRATION FEE:

Registration for CMS and MSA Members \$250.00 _____
(includes the Tuesday evening banquet)
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(includes Sunday reception and banquet)

Late Registration (after May 9, 2003), add a \$50 late registration fee.

CMS Short Course (June 7, 2003) \$75.00 _____

Field Trip #1: Piedmont Soils (June 9, 2003) \$50.00 _____

Field Trip #2: Graves Mountain (June 12, 2003) \$50.00 _____

Field Trip #3: Kaolin District (June 12 & 13, 2003) \$100.00 _____

Guest Program (June 9, 2003) (includes lunch) \$35.00 _____

Guest Program (June 10, 2003) (includes lunch) \$35.00 _____

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I'd be interested in riding a shuttle bus to and from Atlanta's Hartsfield Int'l Airport.

(Prepayment required—check or credit card only)

Total: \$ _____

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Contact Person _____

LODGING REGISTRATION: UGA UNIVERSITY HOUSING

A total of 50 bed spaces have been reserved for the conference. **The UGA University Housing cut-off date is May 9, 2003.** The following residence halls have been requested: Soule, Mary Lyndon, and Rutherford. All rooms are non-smoking and linens are provided.

Please check here if you do NOT require lodging.

Choose Occupancy:

Single (no roommate) \$24.50

Double (sharing with roommate) \$34.00

Name of roommate for double occupancy _____

Choose Nights

Friday, June 6, 2003

Saturday, June 7, 2003

Sunday, June 8, 2003

Monday, June 9, 2003

Tuesday, June 10, 2003

Wednesday, June 11, 2003

Lodging Total \$ _____

METHOD OF PAYMENT FOR LODGING:

Mastercard VISA American Express Discover

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Payment for UGA University Housing may be included with registration fees.

Classic Clays and Minerals

A jointly held meeting of the Mineralogical Society of America and The Clay Minerals Society
June 7-12, 2003 Athens, GA

Workshop

*Vibrational spectroscopy of clay mineral
and layered double hydroxides*

Theo Klopogge
June 7, 2003

Field Trips

1. *Soils of the Georgia Piedmont* – June 8, 2003
2. *Minerals and Environment of Graves Mountain,
Georgia* – June 11, 2003
3. *Kaolin District of Middle Georgia* – June 11-12, 2003

Symposia

- Distal Impact Products and Stratigraphy
- Remote-sensing IR spectroscopy of phyllosilicate clay and other hydrous materials on planetary surfaces
 - Teaching Clay Science and Mineralogy
- Application of Clay Minerals to Radionuclide Removal from Aqueous Solutions
- Structure, Crystal Chemistry, and Surface Reactivity of Environmental Minerals
 - Engineered Particulate Systems • Mineral liquid crystals
- Medicinal Applications of Minerals • Isotope Geochemistry of Surficial Materials
 - Microbial Formation and Degradation of Minerals: A System Approach
- Emerging Interdisciplinary Research in Clay Science: A symposium honoring Vernon J. Hurst

Theme Sessions

- Mineral Structures • Computational Mineralogy • Archeological Mineralogy
- Industrial Minerals • Soil Mineralogy • Shale and sandstone mineralogy

General Chair: Paul Schroeder (706) 542- 2652 schroe@uga.edu

Technical Chairs: Paul M. Bertsch • R. James Kirkpatrick • Christopher Romanek

Field Trips: W. Crawford Elliott • **Fund Raising:** Robert J. Pruett • **Guest Programs:** Linda Schroeder

<http://www.gly.uga.edu/CMS2003>



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