CMS News

A Publication of The Clay Minerals Society

Vol. 10, No. 1 Spring 1998

International Clay Conference in Ottawa

The 11th International Clay Conference and 34th Annual Meeting of The Clay Minerals Society took place last June on the campus of Carleton University in Ottawa, Canada. The meeting was a great success, bringing together clay scientists from all over the world who got the chance to exchange new and exciting technical information, as well as socialize, in an in-

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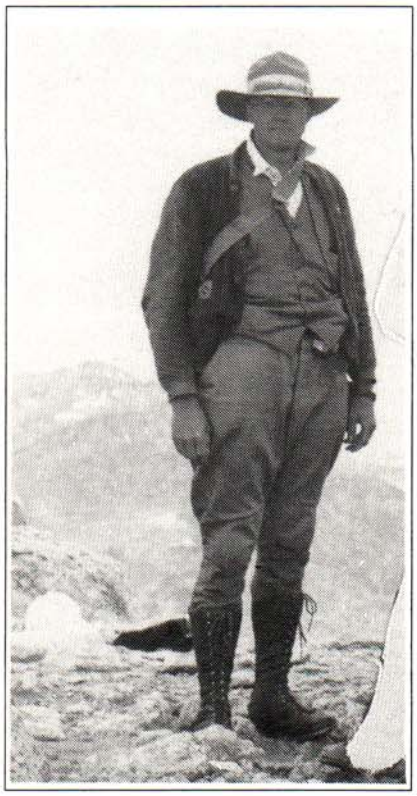
CMS President Steve Guggenheim, far right, thanks Ken Torrance, Jeanne Percival, and Hideomi Kodama for organizing the conference. High Iron Photos

Happy 98th, Walter!



Walter Keller on top of Wind River Peak, Wyoming, 1935. Dr. Keller turns 98 in March. Courtesy W. Keller

Come to Cleveland in June

The 35th Annual Meeting of The Clay Minerals Society will be held from June 6-10, 1998, in Cleveland, Ohio, at the Marriott Society Center in downtown Cleveland. This is within walking distance of a number of attractions: the Flats entertainment district, Jacobs Field (home of the Cleveland Indians), the Rock and Roll Hall of Fame, the Great Lakes Science Center, and many others. Another section of Cleveland, near Case Western Reserve University, boasts one of the best art museums in the country, as well as a good natural history museum, the Cleveland Symphony Orchestra, and other cultural attractions. The pre-meeting workshop will focus on Molecular Modeling of Clays, organized by James Kubicki and William Bleam. Special symposia include: Molecular Modeling of Clays and Clay Surface Properties; Clays in the Petroleum Industry; Smectite Soils: Nature, Origin, and Environmental Problems; New Developments in the Geochronology of Clays and Clay-Like Minerals; and Remote Sensing of Clays.

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Inside ...

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

The newsletter is distributed to all CMS members. Membership rates (1998) are as follows: full membership, including a subscription to *Clays and Clay Minerals*, $60.00/year; student membership, $15.00/year; nonsubscribing membership, $30.00/year. Institutional subscriptions to *Clays and Clay Minerals:* $190.00/yr ($205.00 overseas) for the year 1998. Please contact the Society Office for information regarding new membership, and Allen Press (913-843-1221) for questions concerning current membership.

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

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Call for Nominations & Applications for Editor-in-Chief

The position of Editor-in-Chief of the Clay Minerals Society will become available effective January 1, 1999. Nominations and applications for the position are currently being invited. Principal duties will be the supervision and management of the review, editorial, and publication process for *Clays and Clay Minerals*. The Editor-in-Chief is a member of the Executive Committee and an *ex-officio* member of the Publications Committee of the Society. A stipend is provided in partial support of editorial staff. The Society is seeking an individual with broad knowledge of clay minerals science and with a proven publication record, including evidence of editorial abilities. Please send your nominations of suitable individuals or your application materials as soon as possible to :

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Bradley stories and photos wanted

CMS News would like to do a retrospective on Bill Bradley. Would any members who have stories about him or photographs of him please send them to the Society Office? Thank you.

To join the CMS listserver: send an e-mail message to: listserv@vm.cc.purdue.edu and write a message as follows: SUB CLYMIN-L John Doe (replace name with your own).

Committee Corrections

David Laird replaces Jim Amonette on the Nominations Committee. A new Ad Hoc Committee, K-12 Education, is chaired by Steve Guggenheim.

Many thanks to our advertisers this issue, **Siemens Analytical X-ray Instruments** and **J. S. Technical Services** for helping make this issue possible, and to the **Soil Science Society of America** for reciprocal advertising.

Price Correction

There is no longer a package price for Volumes 1, 2, and 3 of the CMS Workshop Lecture Series. Volume 1 *(Quantitative Mineral Analysis of Clays)* is now virtually out of print.

Journal Donors

Thanks to the following generous donors of subscriptions of *Clays & Clay Minerals* to Eastern European libraries: **Arthur Greene, Randy Hughes, Dewey Moore, Dave Pevear, Frank Serafin, Peter Smart,** and **Michael Velbel.**

Thanks...

To the following people who contributed to this issue:

Adrian Bessara
Wayne Bundy
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Pete Modreski
Haydn Murray
M. J. Nash
Dave Pevear
Rich Pollastro
Steve Rice
Don Scafe
Paul Schroeder
Paul Thiele

Eugene E. Foord

A Personal Remembrance

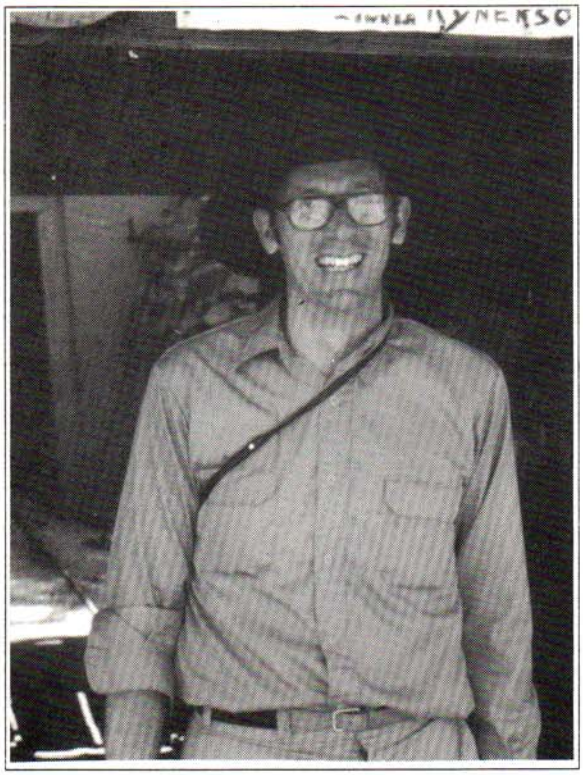
Eugene Edward Foord died January 8, 1998, of advanced lymphoma. He was 51. He is survived by his wife, two children, and a brother. His sad fate parallels that of Carl Sagan, who was treated at the same clinic in which Gene received a bone marrow transplant.

Gene is perhaps less well-known to CMS members than he is to the mineralogical community at large, nationally and internationally. His research ranged well beyond clay to include virtually every mineral known. One of Gene's colleagues has stated that Gene was involved in the identification and description of some 30 new minerals, a remarkable legacy. His knowledge of minerals and mineralogical science was encyclopedic. He was superbly skilled in X-ray diffractometry, SEM/EDS, electron microprobe analysis, and optical microscopy. Gene was generous in sharing his knowledge, as his colleagues in the U.S. Geological Survey and others can testify. Anyone uncertain of the identity of a mineral he was working on could come to Gene for help, and almost without exception, the problem would be solved.

Gene had attained some fluency in the Russian language and became highly esteemed by Russian mineralogists with whom he came in contact.

Mineral science has lost one of its finest practitioners, and all of Gene's professional colleagues have lost a valued friend.

Robert B. Hall
Denver, Colorado



Eugene E. Foord on a 1986 International Mineralogical Association Meeting field trip. *Photo taken by J.E. Taggart, courtesy of P. Modreski*

The Keller/Murray Clay Collection

and

The Murray Endowed Chair in Applied Clay Mineralogy

In June 1997, I learned from Bill Johns that Walter Keller was going to vacate his office at the University of Missouri by the middle of August and that he was very concerned about his extensive collection of clays from around the world. Also, he had file drawers full of electron micrographs. He was worried that his collections would remain in storage for a while and then be discarded. I wrote to Walt and told him that the clay program at Indiana University was going to be continued because the Indiana University Foundation and the Department of Geological Sciences had set up a Murray Chair in Applied Clay Mineralogy which is now 75% funded. I asked him if he would be interested in donating his entire collection of over 600 catalogued clays to my collection of over 400 clays (which would make the collection one of the largest in the world), and he said yes. In November 1997, the E. J. Grassman Trust donated $10,000 to us for cabinets to house the collection, which is now being set up in the Clay Laboratories at Indiana University. The collection will be accessible to students, faculty, and visiting clay mineralogists. The Murray Applied Clay Mineralogy Chair has $750,000 in place, but $1,000,000 is needed to fully fund the chair. A committee consisting of Jessica Elzea Kogel, Tom Dombrowski, Bob Pruett, and Andy Thomas has agreed to solicit corporations and individuals to raise the remaining $250,000 by the end of 1998.

Haydn Murray

Interviews with the clay scientists

Haydn H. Murray

Haydn Murray, a founder of the CMS, as well as a Distinguished Member and past President, is a retired Professor of Geology at Indiana University, where he has been the advisor to almost 100 students. He is also the most recent past President of AIPEA. The interview was conducted in Baltimore in June 1995, by Wayne Bundy, his first student, and Jessica Elzea, a later student.

Drawing by M. J. Nash

CMS: Haydn, it is well known that you have recently retired. This means that you are no longer teaching, but still consulting. Do you ever plan to retire?

MURRAY: No, not as long as I can walk.

CMS: And I presume that throughout this time you will consult.

MURRAY: Consult, and also until I'm replaced in the University, they have told me to keep the clay program going, so I will continue to accept graduate students. Colin Harvey is going to teach the courses next year on a temporary basis.

CMS: How did you happen to choose clay mineralogy as a career?

MURRAY: When I started out, I wanted to be a mining engineer. I went to the University of Minnesota in 1942, and that was interrupted in early 1943. I went into the service and was an officer in the Corps of Engineers, and one course that I took as a requirement in my engineering was a geology course. I really liked that course. When I was in the Philippines, we were charged with roadbuilding, air strips, bridges, and so on, and I really got interested in the geology because of the volcanic activity and the use in construction of cinders and ash, volcanic ash. When I came back in '46, I decided I was going to major in geology. I was going to go back to Minnesota, but Minnesota was on the quarter system, and they started August 10th; it was the beginning of their quarter. I didn't get back until September 1st, and the University of Illinois didn't start until September 25th, so fortuitously, as I was so anxious to get back to school, I went to the University of Illinois. I knew I was going to go to graduate school and get a Masters Degree. I was working on igneous petrology, and I did a Masters thesis on pegmatites in New Hampshire. I came back from my fieldwork in the summer after my first year of graduate school, and Dr. Grim had joined the faculty at the University of Illinois. He said that he had just gotten fellowship money from Illinois Clay Products Company in Joliet, Illinois, and asked me if I would like to become the Illinois Clay Products fellow. It didn't take me long to think about it, because I was a teaching assistant the first year, and without teaching, I knew I could finish my degree probably a year faster than if I had to teach, so I accepted. It was one of the best moves I ever made.

CMS: Who were your most important mentors?

MURRAY: Dr. Grim certainly was the most important mentor that I had. Bill Bradley, who was there at the Illniois Survey, participated in all the seminars, read my thesis, and helped me a lot on X-ray diffraction; so I'd have to say Bill Bradley and Ralph Grim. Grim first and Bradley second. I'd like to mention that when I was a graduate student, we had a very active group of graduate students, such as Sam Patterson, Bob Roth, who did all of the ceramic phase diagrams—in the last few years I think he has published four or five books—Bill Johns, Ed Jonas, Art White, and John Hathaway, who worked up at Woods Hole for a number of years. That group of students of Grim's made a very lasting impression on our science.

Murray, *continued*

CMS: What aspect of clay mineralogy have you most enjoyed?

MURRAY: Well, there are two aspects that I really enjoy most. One is the genesis, the origin, of the clay minerals, and secondly and most importantly, are the diverse applications of all the clays and the reasons for their applications.

CMS: Your academic career was interrupted by several years of industrial research as the Executive Vice President of the Georgia Kaolin Company. Do you consider this experience to have been valuable, and would you do it again?

MURRAY: Absolutely. It was an invaluable experience. I joined the Indiana Survey and the faculty of Indiana University in 1951, when I finished my degree at Illinois. My thesis was on kaolins, and in some way the Georgia Kaolin Company had picked up on it from a published abstract. They were having some problems on viscosity in 1953, and so I started a study analyzing why some clays were viscous and others were not and went through about fifteen different clays in Georgia—X-ray, surface area, particle size distribution, particle shape—and I really got intrigued with that. After I finished it and gave my report, the owner of Georgia Kaolin Company asked me if I would go to work for them. Well, I played coy for a couple of years, and when the salary became three times what my salary at Indiana University was, I said that I would join them. The industrial experience over the next 16 years was invaluable. I learned a lot about many things that I would never have gotten at a university. Of course, one of the nice things was that I took you, Wayne, along to Georgia Kaolin, took John Smith, too, and then eventually Jack Harrison, Bill Moll, and Bob Connally. All Indiana University people, and we became known as the Wabash Club at Georgia Kaolin, sometimes complimentary and other times not.

CMS: What was it like being in a company and watching it grow to be the largest kaolin producer in the world?

MURRAY: When I was at Indiana University, the people, particularly those who interviewed for oil company jobs, would come through. There was always that little comment about the ivory tower, and this really bothered me. And so when the opportunity came to go to Georgia Kaolin, one of the things that motivated me was that I could actually get out of the ivory tower and do management kind of work. The success of the Georgia Kaolin Company was due to picking the right people. Wayne was an outstanding student. He was at the Indiana Geological Survey. I knew him very well, and I knew that when I went to the Geogia Kaolin Company, he could certainly direct the research group there at the Georgia Kaolin Company. I also picked Bob Connally who was an analytical chemist, and then the first geologist in Georgia was John Smith. John did a Masters with me at Indiana, and he was a very, very capable and careful geologist. The company, when I joined them in 1957, was, I think, producing about 350 thousand tons a year. In 1973 when I left, they were producing 1.8 million tons a year. They had become the largest company at that time. What we did to surpass our competition was that we had enough scientific background to expand the company into applications where we knew that the products had a chance to work. I hired Grim as a consultant, Brindley as a consultant, and Bill Johns as a consultant, all of whom helped us in many aspects of our research and development. It was also a time when industry was really developing. We made several new products for various industries, including paper, paint, ink, and so on. So our success was to understand the mineral, to look at potential applications, and to modify the products so that they could meet strict specifications.

The success of the Georgia Kaolin Company was due to picking the right people.

CMS: Was this a relatively new approach in the industry?

MURRAY: Yes, in the clay industry it was.

CMS: So do you feel you set the stage and the pace for your competitors?

MURRAY: I would say the company did, because it wasn't long after that that they all started to build their R&D groups.

CMS: You were one of the original clay mineralogists who helped form the CMS. Would you describe some of its early history?

MURRAY: In 1958 or 1959 I was appointed to the committee that was called the Clay Minerals Committee of the National Academy of Science—National Research Council. When this committee was formed by the Academy,

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Murray, *continued*

they said that when you have enough meetings and a large enough attendance, you are ready to stand on your own and they will no longer sponsor you. They did the publishing, and they picked up some of the money that was needed in the early days when Grim was Chairman, followed by Walt Keller. It was in 1960 or thereabouts that the Academy decided we should form a society. Well, the three who were asked to do that job were Dick Rowland of Shell Development, Jim Early at Gulf Oil, and myself. We spent many, many hours in Washington, D.C., with lawyers, making certain that we set up The Clay Minerals Society so it would be a non-taxable organization. We drew up the original by-laws. I remember those meetings were long and arduous. As many remember, Dick Rowland was not the easiest person to convince or to change his mind. So Jim Early, Dick, and I had a lot of long sessions setting up the Society. It was incorporated and set up in 1963, and Dick Rowland was elected the first President of the Society.

CMS: Who have been some of the interesting and novel people associated with the Society?

MURRAY: Well, Walter Keller is one. I've become very good friends with Walter Keller. He's always intrigued me as a person who questions and questions and questions. He never lets you off the hook. He wants answers.

What we did to surpass our competition was that we had enough scientific background to expand the company into applications where we knew that the products had a chance to work.

Bailey was the most brilliant crystallographer who contributed to the understanding of the clay mineral structures, but outside of his academic activities, he was probably the most mischievous of all the clay scientists. And then Dick Rowland was another one, a different kind of person, but a very penetrating and a very bright person. That whole group at Shell—Dick Rowland, Jack Burst, Chuck Weaver, and others who were part of the group, including Van Olphen and Hugo Steinfink—the interaction of that group, and their contributions were outstanding. Bradley. Bradley was like a computer. He absolutely was a most fantastic person who could practically calculate structure factors in his head. It was unbelievable. I have to tell a story about Bradley. The first time I ever saw him, I didn't realize who he was. I was a senior at Illinois, and another graduate student and I would play handball at five o'clock. We both lived in the trailer courts next to the stadium. I went over, and I got there at five. This guy with a big potbelly came in, and my partner hadn't come yet. This guy said, "Would you like to warm up?" And I said, "Sure." He said, "My partner isn't here yet either." So we went in and hit the ball a few times, and he said, "Do you want to have a quick game?" And I said, "Okay." Well, I was a slammer. I hit the ball hard but did not place the ball low or in corners, and he beat me 21 to 2. I thought, "Geeminy Christmas!" But after that lesson I learned to place the ball and not to slam it. It turned out that this man was Bill Bradley. I played him several times later and never beat him although I was able to score more than two points.

Keller's always intrigued me as a person who questions and questions and questions. He never lets you off the hook.

CMS: What do you consider to be the most pivotal point in your career?

MURRAY: Well, there have been several pivotal points, so it's hard to pick one. I guess I'd have to say that one of them occurred when the owner of Georgia Kaolin died. Within two weeks of that time, a call came from Indiana University asking if I would be interested in the Chairmanship of the Department of Geology. The circumstances of not knowing what was going to happen with the company—I was Executive Vice President at the time, and knew that it would have to be sold because of tax consequences. It was just an uncertain time. When a company like that is purchased, they usually replace the top echelon of people; so I thought, "Well, I'd be better off going out to Indiana and be happy." So I made that decision, and it was a very, very excellent decision.

CMS: Generally speaking, people make their own lives, but you've always claimed that you've been extremely lucky. How do you account for this?

MURRAY: I really don't know why. Being in the right place at the right time is one thing. That is luck. You make your own luck also. I think I told this at my retirement dinner—of the fact that out of the company that I was in, an infantry company, in 1943, two of us were selected to go to the engineer officer candidate school. The rest of that company became part of the 106th Timberwolf division which was practically annihilated in the Battle of the Bulge. I went the other direction to the South Pacific,

Murray, *continued*

and I consider that very lucky. And then the fact of going to the University of Illinois instead of going back to Minnesota, because of the timing of getting out of the service and Illinois starting late; the fact that Grim joined the faculty and that I became very interested in clays. Grim was an excellent teacher, very interested in his students, and we really became very good friends in his later years. And then joining Georgia Kaolin, too—I don't know if you'd call it lucky because I made that decision to join them. And then going back to Indiana. Everything that has happened has been fortunate.

Haydn Murray, flanked by Colin Harvey and Wayne Bundy, his co-editors of Kaolin, Genesis, and Utilization. *High Iron Photos*

CMS: Somehow you have always been able to accomplish a lot in and out of science. How are you able to manage both areas so effectively?

MURRAY: I don't know. My memory has always been fairly good, and I keep a lot of things in my mind and seem able to organize them. Also I never took things home with me. If we had problems either at the Georgia Kaolin Company or at Indiana University, I never carried them home and worried about them in the evenings. I sort of separated that, and I think that was helpful. Also I am a people person who always respects and listens to the ideas and complaints of others.

CMS: Well, memory is one of the important aspects of good science. Did you have any particular techniques that you utilize?

MURRAY: No, not really. I read a lot. Got interested in projects that involved either the genesis or the applications of clays and sort of let that guide my research activities.

CMS: If you had your career to do over, would you follow the same path?

MURRAY: Yes.

CMS: An emphatic yes.

MURRAY: An emphatic yes.

CMS: Your quiet, behind-the-scenes support of people has been one of your more outstanding attributes. There are many people in and out of the Society who are grateful to you. Do you want to comment on this?

MURRAY: I have my own egotistical feelings, but I don't require a lot of backscratching. In fact, it is sort of embarrassing to me, so I try to do things the way I would want them done for me. I do a lot of it behind the scenes and try not to do anything that would embarrass people. I'll never forget one of the things Grim told his students, and that was, "If a person gives a paper and there is an obvious mistake, don't embarrass him or her. See him or her individually, don't embarrass them in front of a lot of people." I always felt that that was very good advice.

CMS: What qualities do you possess that allow you to be so successful a manager of people, both in a university and in an industrial setting? You've also been Executive Vice President of a major company, you've been President of innumerable societies, Chairman of the Department of Indiana University. What do you think it is that has allowed you to take on these roles so successfully?

I'll never forget one of the things Grim told his students, and that was, "If a person gives a paper and there is an obvious mistake, don't embarrass him or her. See him or her individually, don't embarrass them in front of a lot of people."

MURRAY: In the first place, you have to be a very good listener, and listen to what people are saying to you. I find that that quality is not evident in a number of people. You think they are listening, but they are really not hearing

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Murray, *continued*

what you are saying. I've tried to listen carefully, to understand the problems that people might have, to understand where they're coming from, so that I can make a proper decision.

CMS: Can you tell us a little bit about your very early life?

MURRAY: I was born in north central Illinois at Kewanee, Illinois. I lived on a farm. My father was a farmer, and my brother and I always did a lot of work on the farm from an early age. So the outdoor life, just the freedom of being on a farm, meant a lot to me. My father died in 1993 at 91. My mother is still alive and is now 97. So the farm life is a healthy one.

CMS: You have a very impressive family which certainly must have had a major influence on your career. Would you tell us something about them?

MURRAY: Well, first of all, my wife has been and is a very supportive person. Most people, I don't think, would tolerate the travel and the time I spent on the job and going back to the office at nights to catch up on work. So she has been very understanding and supportive. We have three children. Steve got his Ph.D. at Southern Cal in geochemistry and is now the head of an offshore exploration group for Pennzoil. He has been very successful in his career. My daughter Marilyn got her Masters Degree at UCLA in Public Health Administration, and my youngest daughter Lisa, a nurse, got her degree at Vanderbilt. Steve and Marilyn both went to Duke for their undergraduate education. I think that a major reason they have been successful, good kids is my wife. She really mothered them correctly through the years and now is a wonderful grandmother to over six grandchildren.

The outdoor life, just the freedom of being on a farm, meant a lot to me.

CMS: Do you attribute any of their success to your guidance?

MURRAY: At Georgia Kaolin Company, particularly when I was Executive Vice President, we had operations in Texas, Southern Clay Products; we had bentonite clay in Wyoming; we had the Georgia operations; we had a joint venture with AKW in Europe; we had a company in New Zealand. All of this took a lot of time traveling. So I was away probably half of every month, normally home on weekends, however. But what I did at every spring vacation was take the kids separately, not together. I would take Steve with me fishing or spend a week with him or with Marilyn or Lisa. I think you get to know your children very well when you're on a one-on-one vacation kind of outing. That got me closer to the kids, and they appreciate that time we had together even today.

What I did at every spring vacation was take the kids separately, not together.

CMS: With the advent of X-ray diffraction in particular, clay mineralogy grew by leaps and bounds. Do you still see a bright future for the science of clays?

MURRAY: Yes, I certainly do. One of the various clay mineral groups, particularly the three groups, kaolins, smectities, and palygorskite-sepiolites, all have particular properties that make them useful in many, many applications. Applications are growing, we're learning more about the clays, and clays are one of the most important of the industrial minerals and will continue to be. They are unique in their properties, and are natural materials that would be very difficult to replace synthetically.

CMS: What advice would you offer to people who are considering clay mineralogy as a career?

MURRAY: I think there is certainly a future in clay mineralogy. Of course, I'm biased, but taking the data we have from X-ray diffraction, from all the chemical data and the physical properties and so on, and correlating that information with practical applications is quite important. We, of course, need fundamental information, but you also need somebody to translate that information into practical applications.

CMS: You're known primarily for the research you've done in kaolins, starting with your Ph.D. research, but you also mentioned that you did some work on pegmatites. What other areas have you worked in?

MURRAY: Well, in my first tour at Indiana University, I was not only clay mineralogist for the Indiana Geological Survey, but I also taught sedimentation and sedimentary petrology. I did work on sedimentation, on deep sea sediments; so in the early years sedimentation, sedimentology was an area in which I did some publishing.

Murray, *continued*

CMS: What do you consider your greatest contribution to clay science?

MURRAY: I'd say the greatest contribution is having the large number of excellent students that I've had and who are now very active in many, many different jobs. Some examples are Andy Thomas, now with Texaco, doing their clay work; Wayne Bundy, who's been so successful in his career at Georgia Kaolin; and now you, Jessica Elzea, at Thiele; Bob Pruett and Jun Yuan at ECC; Tom Dombrowski at Engelhard, and I could go on and on. The success of the students has been most important.

Haydn Murray and a small part of the Bloomington group, in Minneapolis, 1992. Kneeling: Andy Thomas, Colin Harvey, Wayne and Lorraine Bundy. Standing: Tim Salter, Bob Pruett, Peter Brandlein, Tom Toth, Haydn and Juanita Murray, Bill Moll, Jessica Elzea, Tom Dombrowski, and Silvana Bertolino. ***High Iron Photos***

CMS: Well, I had the good fortune of being your first student, and since then you have worked with a multitude of students, all of whom hold you in high esteem, who greatly value their experience with you.

MURRAY: I just counted up the number of theses on my shelf, and there are 96. My first round at Indiana University, and then my second round. The interaction with the students has been the most rewarding part of my career.

I'd say the greatest contribution is having the large number of excellent students that I've had and who are now very active in many, many different jobs.

CMS: All of us are attracted to science for various reasons and to research, in particular, for the sense of discovery. I am curious about how you feel when you are discovering something new, and whether that is what attracted you to research?

MURRAY: It's exciting when you have a problem and you at least have it partially solved, or at least you think you have it solved. It's a very, very exhilarating feeling. I enjoyed the problems, but more the problem solving.

CMS: If you were to choose an area in clay science to do research in now, what area excites you most? What would you want to get involved in?

MURRAY: I think the viscosity problem in kaolins is probably the one that I would really focus my attention on. I've probably seen as many kaolins around the world as anybody, and the significant differences in properties—there are no two deposits alike. Also the evaluation of why these differences exist intrigue me.

CMS: Do you think we are any closer to finding a solution to this very fundamental problem?

MURRAY: Well, I think we understand pretty much what causes high viscosity, but we haven't learned how to solve it yet. It can be mineral content, it can be particle shape, it can be particle size distribution, it can be soluble salts. We'll get there; it's a solvable problem.

CMS: Why did you return to academia after a very successful industrial career, besides the fact that you had an offer and there was timing there? There must have been something else that made you want to go back to that environment.

MURRAY: I always felt that a university professor was freer than any other job that I was familiar with because you were absolutely your own boss. You could pick the research that you wanted to do, you could attract students to help you, and you could motivate them to do their research. It's just a very wonderful life. I enjoyed the industrial time very much, but you certainly are not your own boss in industry. The time constraints, the financial problems, always looking at the bottom line—you just sort of burn out after a time. I think I was ready to move. I didn't realize it till the owner of Georgia Kaolin died, and then when I started thinking about it, it was time to move.

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Murray, *continued*

CMS: You mentioned freedom in academia over the years. Have you seen that change? Is that still there?

MURRAY: It's still there, but it is changing, and it will change even more in the future, I'm sure. I'm not sure exactly how I feel about tenure. I've seen tenure in many cases as a good thing, but also I've seen it as a bad thing, because there are people given tenure who have been very active and contributed a lot, and then once they get tenure they sort of hibernate, and that's bad. At present there's no way to change that; you cannot get rid of them unless they do something that is illegal. So there are good aspects, and there are bad aspects. I expect that the tenure system is going to change in the future.

CMS: What do you think the future of clay mineralogy in industry is going to be?

MURRAY: I think an essential ingredient in any company that is dealing with clays, i.e. kaolin companies, bentonite companies, absorbent clay companies—to understand the basic fundamental structure, composition, surface properties, and so on, is exceedingly important. And the clay mineralogist is the one who really is best trained to understand that. Chemists in a laboratory never really fundamentally understand some of these aspects.

I enjoyed the problems, but more the problem solving.

There are exceptions, of course. A clay mineralogist is trained and sees some of the properties and applications a lot faster.

CMS: What sorts of pressures does the clay mining industry face now?

MURRAY: Well, the kaolin industry, let's go to that one first, the kaolin industry will essentially disappear in Georgia in about forty to fifty years because the Cretaceous clays will disappear. They are a completely different type of clay than the Tertiary clays that occur in east Georgia. There are adequate reserves in the Tertiary clays to last another 100 years at least, maybe more. The center of the clay industry as we know it today will move to Brazil. The Amazon area in Brazil has a wealth of kaolin reserves, which are excellent quality, and that's where most of the high quality clays in twenty years will come from. Wyoming bentonites are currently easy to mine, particularly the high swelling oxidized clays which are near the surface. As time goes on in all the mining industry, you always find a way to enhance the use of marginal deposits. An example in the kaolin industry is the magnetic separator. It probably doubled the reserves of kaolin available. And as we go on to the bentonite industry, there isn't another sodium bentonite deposit in the world that's equivalent to those in Wyoming, and I don't see that any are going to be found either, in the future. So we are going to have to learn how to modify other bentonites to make them similar to the Wyoming material. For sepiolite, palygorskite, attapulgite, China is going to be a major factor. I saw two big deposits in China recently that are much bigger than any I've seen anywhere else in the world. Senegal also has big deposits, so that industry is going to shift out of the United States. One of the problems in the United States is the cost of production in comparison to some country like China where the labor costs are lower and they don't have any clean air/clean water requirements which affect the growth of the industry in the United States and Europe.

I think the viscosity problem in kaolins is probably the one that I would really focus my attention on.

CMS: You mentioned that a lot of the clay mining companies are going to have to learn how to mine and process deposits that are of lesser or different quality than what they are currently mining, and it sounds to me like that may give clay scientists an opportunity to go into the research departments of these companies and contribute to that process.

MURRAY: Absolutely. I'm just noticing at this meeting in Baltimore, the large number of papers on iron in kaolin. Iron is a colorant, and a major factor in the utilization of kaolins. We have a lot of kaolins with high iron content that do not meet the brightness standards, so that kind of research is vital to our understanding of how to remove this iron.

CMS: Although industrial science and academic science have many similarities, there are also differences. Scientists who are graduating with Ph.D.'s usually do not have a very good background in industrial research. They have to learn this on their own. Do you think that institutions of higher learning should try to address these needs?

MURRAY: I certainly do. The Indiana University Foun-

Murray, *continued*

dation has set up a Murray Chair, which will be fully endowed in one year or so in applied clay mineralogy. What I have done over the years (because of my industrial experience, I've always had companies sending me samples with problems) is use graduate students to do the lab work. In this way, they get a feel for the problems in industry and what tests to make to help resolve them. In general, the students who come out of the lab at Indiana have a good understanding about industrial problems.

Haydn Murray being interviewed by Jessica Elzea and Wayne Bundy, Baltimore, 1995.
High Iron Photos

CMS: You have promoted extensive interactions between industry and academia. Can you suggest ways in which this interaction can be expanded?

MURRAY: Well, the Clay Mineral Society needs, in my belief, an application section at each meeting. This is going to draw industry to the Society and indicate to them that the Society is interested in helping them with their problems. Unless they see that, some industry people are not really interested in attending the meetings. I had several people from industry say the New Mexico meeting had one of the best sessions they had attended, and that if we continued to have sessions like that, that they would continue to come to the meetings.

For sepiolite, palygorskite, attapulgite, China is going to be a major factor.

CMS: Are there undiscovered deposits out there, or have we found them all?

MURRAY: We haven't found them all. A good example of that is Brazil. In the Amazon area, there is a relationship between bauxite and kaolin. Kaolin in many areas of the world is a precursor to bauxite. There are bauxites that extend from Belen to Manaus on the Amazon River, which is almost 2,000 miles. Two small areas have been prospected for kaolin in that area. I am certain that there are many other areas that have kaolin. On the north side of the Guyana Shield, particularly in Guyana and in Surinam. In Surinam I've seen deposits very similar to those in the Amazon area, but because of the political climate, they have not been developed. Those could be developed. I don't think that there are many areas, however, of kaolins that we will find with low viscosity. Only one of the many deposits I've looked at in China has both good viscosity and brightness. Bentonites: I think that there is a lot more potential for finding new bentonite deposits than kaolin. In Argentina is the thickest bentonite deposit that I have ever seen. It was at least 40 feet thick and is a very good quality bentonite, near the Andes, in western Argentina.

CMS: Was it a calcium bentonite?

MURRAY: The analysis showed about 40% sodium, 60% calcium in the exchange position. So it was high quality, and it could be mined. But that was just discovered three years ago. So I think there's a lot of potential, particularly in the Pacific Rim countries where there's been a lot of volcanic activity. As far as the attapulgites are concerned, palygorskites, we know of several deposits, but the ones in China that I looked at were huge deposits and were never developed, so they have a lot of potential.

In general, the students who come out of the lab at Indiana have a good understanding about industrial problems.

CMS: Kaolin is a versatile industrial mineral and its most important use is paper-making. In recent years calcium carbonate has made some serious inroads and is continuing to do so. Do you think the kaolin industry is addressing this threat?

MURRAY: I don't think that they have really done enough. They are beginning to see that calcium carbonate is a threat, not only replacing a lot of kaolin as a filler, but also they been very complacent about the coating area.

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Murray, *continued*

They need to address that problem, and to look at the synergism between calcium carbonate and kaolin in much more detail than they are doing now. The growth of the printing industry, the paper industry, is going to continue. There is going to be room for both, so we need to do more work in that area because both have properties that can be utilized.

CMS: What are some of your interests outside of clay mineralogy?

MURRAY: I like athletics of all kinds. I like to hunt, I like to fish, play golf. One of the most fascinating times of my career has been since1984. I'd said that I would not accept the Chairmanship again, that I wanted to teach and do research and that they should find somebody else to chair the department. And I gave that up July 1, 1984. Well, it wasn't two weeks later when John Ryan, who was then President of Indiana University, called and said, "Haydn, now that you don't have anything to do, how would you like to be the faculty athletic representative?" I said I had no idea what that job entailed. The fellow that had it before was Dean of the Business School. Ryan said, "Why don't you go over and talk to the faculty rep and ask him what the duties are?" So I did, and he said, "It won't take much time, we have a good stable group of coaches, and the athletic director is set." He said maybe a couple of hours per week. Well, famous last words! It was a time-consuming job, which took days instead of hours, but I did enjoy it, and I held it for ten years until I retired. That has been a very fascinating part of my later years.

Haydn Murray introducing Distinguished Member Bill Johns at the Baltimore meeting, 1995. High Iron Photos

CMS: How would you summarize your career?

MURRAY: I don't know how anyone could have a more enjoyable career. I have been able to do research, to publish, to manage, to be of service in many societies, to do exploration and evaluations in over 60 countries in the world, to train many wonderful students, to have a wonderful family, and to enjoy my hobbies and enjoy life. What more can one ask?

Haydn Murray's Bloomington Bunch

Haydn Murray's students: Cliff Ambers, Donald Aung Ba, William F. Bandy, Jr., Nathan P. Bennett, Bruce F. Bohor, David H. Breedon, Allen R. Brockman, Scott D. Broekstra, Paul J. Brulla, Wayne M. Bundy, David A. Burke, Brett D. Carney, Pei-Yuan Chen, Edward J. Clements, Ronald C. Crane, Donald Devening, Joseph A. Dixon, Tom Dombrowski, Jeanette Bauman Du Bois, Benjamin Edwards III, Jessica Elzea-Kogel, Ferol F. Fish, Jr., Shankar N. Ghose, Seymour S. Greenberg, Robert D. Hacker, Stephen J. Hall, Denver Harper, Jack L. Harrison, Ty A. Harter, Colin C. Harvey, Richard P. Heberton, George A. Herr, Olin R. Holt, Janelle L. Janssen, Tim W. Johnson, Karan S. Keith, James B. Koenig, Lisbeth A. Kovach, Lucia Kuizon, Richard Larson, Jean Hemzacek Laukant, Richard K. Leininger, Karl C. Lemmerman, Jane E. Matthews, Elizabeth Matney, Richard B. McCammon, Jason T. McCuistion, Roland Merkl, Clayton L. Millard, Michael E. Miller, William F. Moll, Jr., Carolyn G. Olson, Michael S. Orlich, Jeffery S. Oslund, Delwin L. Parker, Dennis C. Parker, Irwin S. Parrish, Arthur P. Pinsak, Martin Prinz, Bob Pruett, Paul C. Raymond, Jr., Franz J. Reisch, Mark Reshkin, Frank A. Revetta, Samuel L. Riely, Jr., Daniel L. Rimstidt, Stephen D. Robbins, Budi Rochmanto, Timothy L. Salter, Abdullah S. Sayyab, Neil R. Schemehorn, Christopher E.K. Schubert, Nelson Shaffer, John M. Smith, Randall Taylor, Andrew R. Thomas, Maxwell J. Tilford, Tom Toth, Keith R. Treadway, Don M. Triplehorn, Ken Vance, Carl Vandivier, Stephen W.H. Walker, Jill Weintraub, Xiujia Weng, Bruce A. Wright, Teruo Yamamoto, Martin G. Yates, Jun Yuan, Huitang Zhou.
Post-Doctoral Assistants/Visiting Research Scientists: Peter Adolphi, Carlos Alberto Alves, Silvana Bertolino, Peter Brandlein, Fernanada Cravero, Eduardo Dominguez, Georges Ekosse, Emilio Galan, Mario Iniquez, Eva Kocsardy, Gianni Lombardi, Manfred Storr, Krzysztof Szamalek, Aziza Youssef.

Ottawa, *continued from page 1*

formal setting amongst the rural tree-rich grounds of the campus.

Attendance was high and represented an interesting cross-section of scientific endeavors and international flavors. I saw and learned much that warranted incorporation into my own work and heard about some new and fascinating findings in a wide spectrum of clay research. Hideomi Kodama, J. Kenneth Torrance, and Jeanne Percival deserve a great deal of thanks for the terrific job they did in organizing and coordinating the conference. The result, a smoothly executed meeting (to these eyes) for the large and particularly diverse crowd, was a reflection of the effort and care that they and their band of volunteers put into the details.

This year's meeting, as usual, included many excellent symposia. Among the ones I enjoyed and found valuable were the sessions on Mössbauer Spectroscopy studies of clay structure and chemistry; the use and impact of TEM and XRD data for studies of

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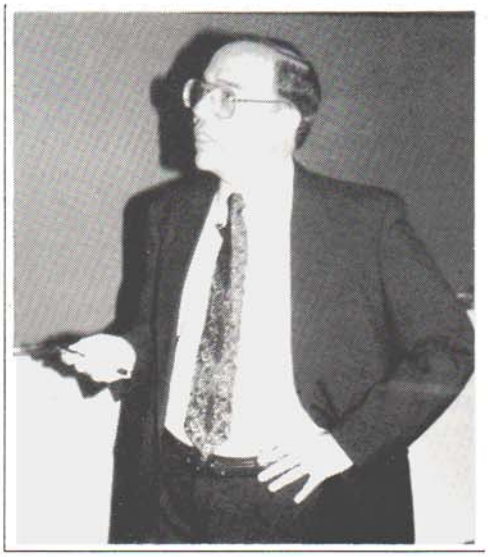

Paul Nadeau presents the 1997 Brindley Lecture. High Iron Photos

Grant Mossup and Don Cook explain the McConnell fault in Bow Valley Provincial Park, Alberta, on the Rocky Mountain Field Trip. High Iron Photos

Udo Schwertmann accepts the CMS Distinguished Member Award from incoming President Joe Stucki. High Iron Photos

Robert Schoonheydt, Secretary-General of AIPEA, and Jorge Manuel Vallés. High Iron Photos

Raul Monsalvo, Maria Guadalupe Miranda, and Lourdes Chavez-Garcia at the Student Reception. High Iron Photos

Ottawa, *continued*

layer silicates; agriculture and the environment; and isotope geochemistry of clays and clay minerals. The technical sessions were held in several different lecture halls distributed over the compact campus. This created a bit of a dilemma when I kept running into old friends en route to the next talk over in a building on the other side of the campus, but in the end it worked just fine and got me a bit of fresh air in between lecture halls.

The theme for the meeting was "Clays For Our Future." We saw many fine examples of how clays are used in industrial and commercial applications, and in helping to improve our natural environment and to protect against destruction and toxic contamination. We saw how wonderfully variable, astounding, and useful the properties of these tiniest of physical particles are, and how they may be put to use in the future to

Alain Plançon and Hafsia Ben Rhaiem talk in Ottawa. *High Iron Photos*

Gejing Li, Hailiang Dong, and Yitian Xiao at the Barbeque. *Jo Eberl*

C. V. Jeans, Steve Guggenheim (outgoing CMS President) and Faiza Bergaya. *Jo Eberl*

Jerry Bigham, 1997 Jackson Lecturer. *High Iron Photos*

Jan Srodon, Dave Pevear, Vlado Sucha, and Ivan Kraus. *Jo Eberl*

mental particle model and paradigm. Jan Srodon's particularly interesting talk (co-authors Drits, Eberl, and Elsass), linking important threads of fundamental particle and mineral growth theories, gave me a greater understanding and appreciation of this popular subject. The most concise talk I heard at the conference was from Dave Pevear (co-authors Houser, Robinson, and Reynolds) and deserves a mention. Dave gave us a primarily pictorial presentation of stunning clarity in which he demonstrated how illite polytypes are likely a natural "out-

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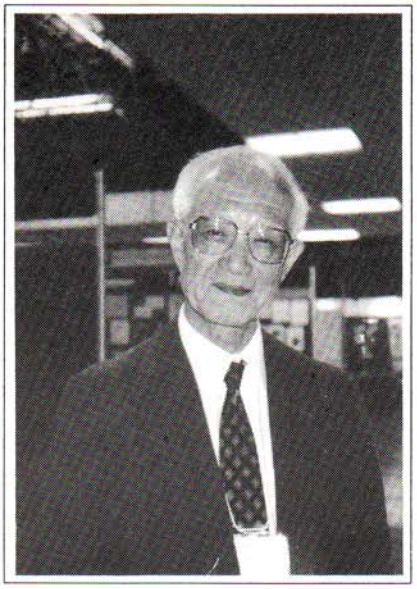
provide benefits for human society and to help preserve or allow minimal impact on the global ecology.

Koji Wada, presented with the 1997 Pioneer in Clay Science Award, shared with us his life-long fascination with volcanic ash-derived soils, and his seminal work on amorphous and poorly-ordered soil components. A terrific overview of the historic development of iron oxide research was delivered by Jerry Bigham, the 1997 Jackson Mid-Career Clay Scientist, while Paul Nadeau, the 1997 Brindley Lecturer, gave an enriching retrospective on the work and data leading to the development of his funda-

Phillippe Ildefonse, Dave Bish, and Jean-Pierre Muller. *Jo Eberl*

Sylvia Couto-Anjos. *Jo Eberl*



Dr. Akihiko Yamagishi. *Jo Eberl*

Benny Theng. *Jo Eberl*

Ottawa, *continued*

Koji Wada, Pioneer Lecturer. *High Iron Photos*

Hafsia Ben Rhaiem, Claudine Durand, and Antonio Vieira-Coelho. *Jo Eberl*

Hideomi Kodama, General Chair of the International Clay Conference. *High Iron Photos*

Bruce Velde and Jan Srodon, incoming Council Members, and Dave Pevear, incoming Treasurer, of CMS. *Jo Eberl*

Derek Bain, Editor of Clay Minerals. *High Iron Photos*

Gerhard Lagaly at the banquet. *Jo Eberl*

Fritz Madsen and Kurt Czurda. *Jo Eberl*

Bob Pruett at the Sustaining Members Breakfast. Jo Eberl

AIPEA President Haydn Murray presents the Bradley Award to Anne Galarneau, student of Tom Pinnavaia, who introduced her. High Iron Photos

growth" of their environment, and in the process showed the value of high quality mineral surface microscopy and a good picture or two.

The AIPEA Gold Medal was presented to two eminent clay scientists, Herve Chamley, and Victor Drits, who unfortunately was unable to attend due to illness. The AIPEA Bradley Lecturer was A. Galarneau, a student of Tom Pinnavaia.

After seeing many of the technical sessions and vendor displays, I was struck by the dramatic development of computer software in clay science over the last five years. Ever

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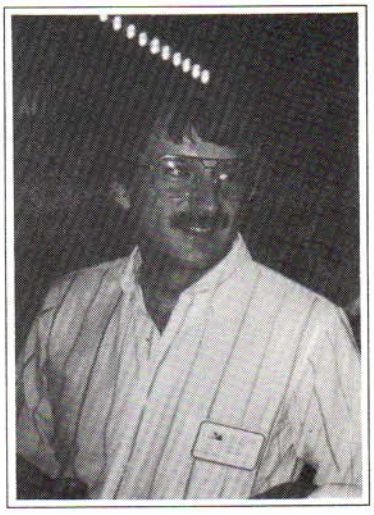
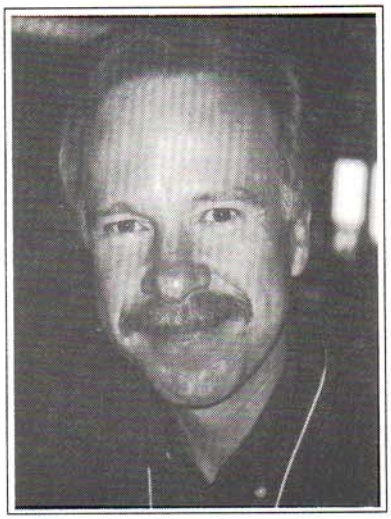
Jock Churchman explains his poster to Daniel Tessier. High Iron Photos

Eric Daniels at the Sustaining Members Breakfast. Jo Eberl



Steve Chipera, Continuing Education Chair. Dave Pevear



Richard Brown, Finance & Budget Chair. Jo Eberl

Ottawa, *continued*

more sophisticated computer applications are becoming readily available to clay scientists' probing minds. The first forays of bold clay people exploring one of the most intriguing and dynamic of these cyber-neato developments will share their findings at next year's CMS meeting, in the workshop and symposium on Molecular Modeling Studies of Clays. Be sure to attend to catch a glimpse of this rapidly growing and exciting area of research and application in our discipline.

I chose to stay in the campus housing, out of a desire for quick and convenient access to the meeting. Although it caused me to flashback on some long-forgotten undergrad years in college, it also opened up opportunities for enjoyable conversation with new and old friends in the halls and surrounding grounds. A side-benefit of my campus residence was observing the pomp and musical circumstance of the Canadian Royal Color Guard academy students, complete with kilts and a memorable mid-afternoon bagpipe solo!

Conference participants also enjoyed the close proximity of downtown Ottawa, a city set on the Ottawa River amidst a beautiful pastoral countryside. The city offered many fine architectural and cultural areas of interest to see. The banquet was held in downtown Ottawa, at the Westin hotel. Some lucky attendees arrived via a boat which ported them up the historic Rideau canal to the downtown destination. The banquet was both elegant and excellent. A wonderful classical quartet played soothing music while we ate an outstanding meal with some of the best food I have had at any banquet. The crowd's after-dinner encounter with historic figure Colonel By was quite amusing and informative... the region has a rich cultural history woven around man's encounters and interactions with the natural environment.

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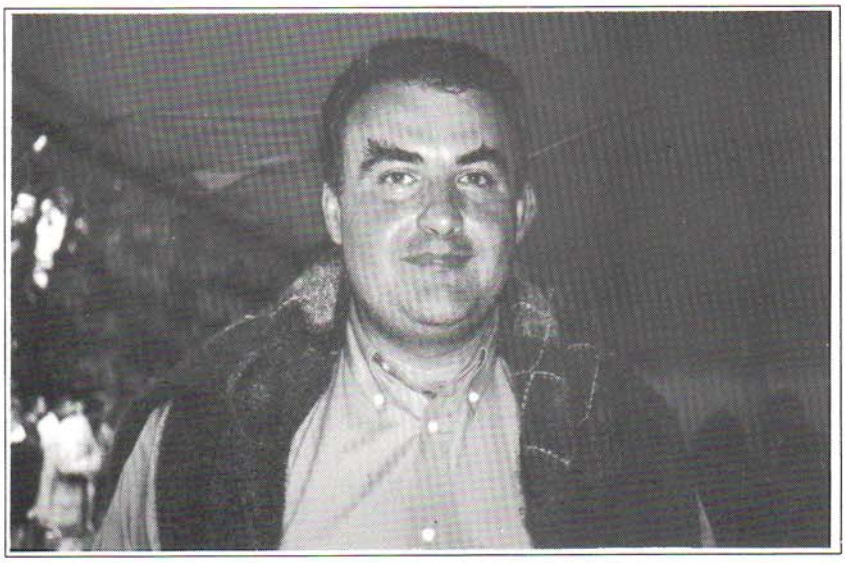
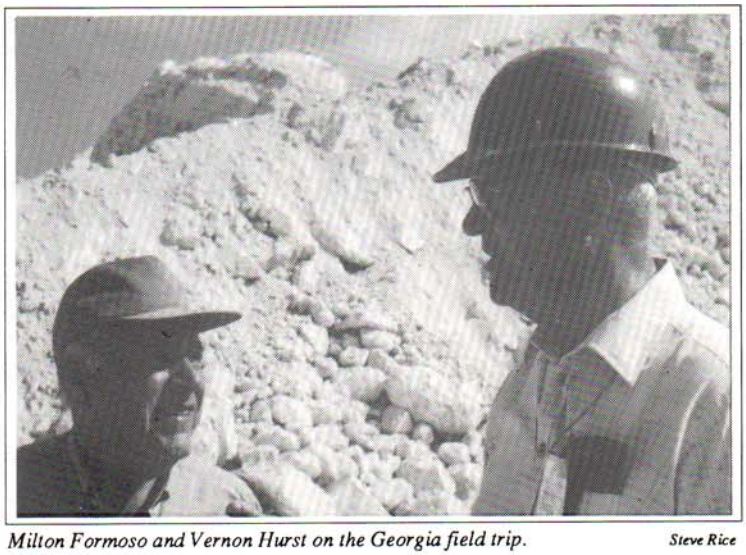
Les deux Alains: Plançon et Manceau. *Jo Eberl*



Iulio Bobos. *Jo Eberl*



Milton Formoso and Vernon Hurst on the Georgia field trip. *Steve Rice*

Student Profile

Elizabeth Gardner

Beth Gardner *Courtesy E. Gardner*

Origins: I am originally from Newport, a small town in Pennsylvania. It's about 30 miles northeast of Harrisburg, PA. I did my undergraduate studies in Pennsylvania, at Penn State.

Place of study: From Penn State, I went to Michigan State University to continue studying chemistry.

Thesis advisor: I am under the gentle tutelage of Dr. Thomas J. Pinnavaia.

Thesis topic: Officially it's "Oxidative Catalysis by Layered Double Hydroxides Intercalated with Polyoxometalates and Metallocycles," but it's been evolving.

Clay work: I work with layered double hydroxides (LDHs). My first problem as a graduate student was to intercalate some polyoxometalates (POM) into MgAl- and ZnAl-LDHs and investigate them for catalytic oxidation of organic contaminants in the environment. If you are familiar with LDHs, you will know that this is not as easy as it may sound. Whenever a polyoxometalate is intercalated into an LDH, there is an accompanying impurity phase resulting from a hydrolysis reaction between the acidic POM and the basic LDH. I spent a lot of time thinking about the chemistry of LDHs, and from that came a synthetic method for making LDHs which resulted in colloidal-sized particles. Thin films of these small particle LDHs are extremely well oriented and we decided to intercalate anionic radicals into these films in order to describe the anion orientation by electron spin resonance.

The Boss, Tom Pinnavaia. *High Iron Photos*

Other interests: Graduating, gardening, British comedies on PBS, and a local group we formed last semester, ACS Women in Chemistry. In addition, once a month I volunteer at a local shelter.

Favorite book, poem, music, artist, and/or quotation: Hmmm... well, even though you didn't ask, my favorite scientist is Richard Feynman. My favorite authors are a varied lot. André Norton, Dorothy Gilman, Tolkein, Heinlein, Barbara Michaels, and L'Engle are but a few. I like rock music most of all, but never remember the artists or the titles of the songs and have never been much into poetry.

Anything else interesting: Well, before I started college, I owned a bookstore for five years.

Favorite clay: I have seen other researchers' humorous answers to this question from The Clay Minerals Society, so I wanted to come up with something really good. Hah! I went to a couple of Dr. Pinnavaia's books on clays, and the most interesting thing I found was ferrous lizardite. But the boss said that I was saying it incorrectly—it isn't pronounced like the reptile, but rather "lizard" rhymes with "yard." So I asked him, "When you think of Elizabeth Gardner, what clay comes to mind?" He answered, "Hydrotalcite," which is really boring, but probably quite accurate.

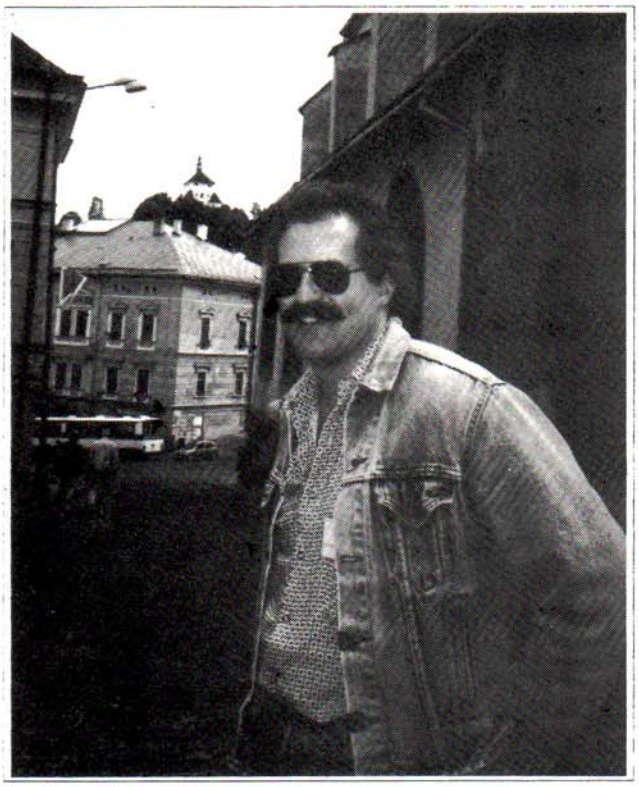
Feats of Clay

Jack Burst was awarded the University of Missouri-Rolla's Alumni Merit Award for outstanding achievement or service to the campus or the MSM-UMR Alumni Association.

The Mineralogical Society of Great Britain and Ireland awarded Honorary Membership to the President of Romania, **Dr. Emil Constantinescu**. The award is in recognition of President Constantinescu's strong association with the Mineralogical Society and the high profile he continues to give to mineralogy, through his current presidency of Romania. Only 20 eminent mineralogists hold the position of Honorary Membership at any given time.

Dave Bish is one of two 1997-1998 MSA Lecturers. He will be lecturing on Mineral Evolution in Low-Temperature Environments; The Critical Role of Mineralogy in Radioactive Waste Isolation; and Better Living Through Mineralogy: Minerals and Our Environment.

Theo Kloprogge has moved from The Netherlands to Brisbane, Australia, where he has accepted a postdoc position with **Ray Frost** for the next two years. Their project will be mainly focused on the IR and RAMAN spectroscopic study of clay minerals and especially synthetic clay minerals.



Will Gates (in Slovakia last year) is now in Australia. *Dennis Eberl*

Will Gates has also moved to Australia where he has been appointed as a research scientist in clay mineralogy with CSIRO Land and Water (formerly Division of Soils), Adelaide, South Australia. Duties include development of new techniques utilizing clays for the remediation of sites contaminated by inorganic and organic compounds.

Dougal McCarty has taken a position at Texaco EPTD in Houston, where he is working with **Andy Thomas.**

Kathy Nagy has taken a position in the Geology Department at the University of Colorado in Boulder.

In November **Rich Pollastro** gave the opening keynote paper titled "Empirical Appraisal of Illite/Smectite as a Geothermometer and Hydrocarbon Exploration Tool" at the Annual Fall Meeting of the Clay Minerals Group of the Mineralogical Society at the British Geological Survey in Nottingham, England.

Sridar Komarneni has recently given invited talks in Bratislava, Slovakia; Takamatsu, Japan; Kochi, Japan; Kyoto, Japan; Chiba, Japan; and Ube, Japan. He is also the co-editor of a book titled, *Nanophase and Nanocomposite Materials II*, published by the Materials Research Society, Pittsburgh, PA.

Donald Sparks is the editor of *Methods of Soil Analysis: Part 3—Chemical Methods*, published by the SSSA/ASA.

The CMS extends its deepest sympathies to **Bill Johns** on the loss of his beloved daughter Sydney.

The CMS notes with sadness the death of **Charles Drake,** a friend to many clay mineralogists at Dartmouth.

Ask the Clay Doctor

(Not a real doctor)

Dear Clay Doctor: I am a poet who would like to get into clay mineralogy. What do you suggest?
Necip Groovin, Lubbock

Dear Dr. Groovin: We can help you with the hard science, but for now I suggest that you ease into the field by writing poems about clay. Rhyming should be easy because most mineral names end in "ite." For example:
The weathering product in granite
Most frequently found is kaolinite.
On second thought, we could use your help.

Dear Clay Doctor: I have been working for over four years on a paper and can't get anyone to read it. Should I throw in the towel?
Mountain Dewey, Urbana

Dear Dr. Dewey: Perhaps your paper is too long. Try removing every other word.

Dear Clay Doctor: I have been studying the octahedral sheet of kaolinite for 25 years and can't take it any more. I am going nuts.
Fred Shortstaffe, London

Dear Dr. Shortstaffe: You are in the throes of a mid-life crisis. It is time to muster the energy and courage needed to take a leap of faith into the great unknown by making a major career change. I recommend that you chart a new direction for your life, for example, by studying kaolinite's tetrahedral sheet.

Dear Clay Doctor: I notice it's always the old guys from the sixties who think it's funny to make rabbit ears in photographs in *CMS News*. Why don't they grow up?
Disgruntled in Dallas

Dear Disgruntled: Instead of a secret handshake, people from the sixties make rabbit ears. They didn't do it so much in the sixties, so it's actually a sign of maturity.

Dear Clay Doctor: Did Bill Clinton ever do it with anyone in The Clay Minerals Society?
The Geese, Buffalo

Dear Dr. Geese: I have checked with the Society's historian, and there is no record of this even. In fact, the historian reports that there is no record of anyone in the Society ever having done it. However, we have appointed a special counsel to look into suspicious circumstances surrounding the naming of the mineral clintonite.

Dear Clay Doctor: I've been hearing a lot about a new 'Clay Diet.' Is this for real?
Sedi Mentary in Seattle

Dear Sedi: Oh yes, it's a great new diet that enables you to eat whatever you want, whenever you want, and you still lose weight. The only restriction is that you can only eat as much as you can fit on a clay plate.

Dear Clay Doctor: Whenever I turn on the evening news, all I hear is Clintonite. What's the deal with Clintonite?
Clueless in D.C.

Dear Clueless: Where have you been? While this issue has only recently come to light, there are people who believe that it's been going on for over twenty years. But regardless, whenever Clintonite is present, it is accompanied by problems within the sheets. So far, the federal government has spent 30.7 million dollars just trying to determine the formal charge.

Dear Clay Doctor: Why do so many mineral names end in "ite?"
Mad Fritzen, Zürich

Dear Wondering: Because it is hard to pronounce names such as "montmorillonuartz."

(overheard at a recent CMS meeting):

Graduate Student: Hello Clay Doctor, I am a graduate student just starting my thesis research, "Affixing a Single Illite Crystal to a Nanowire for Single Crystal X-Ray Diffraction," and I was wondering if you had any general clay book references you could recommend?

Clay Doctor: I am sorry to say that I do not have any clay books. I do have a clay tablet or two laying around. Heh, heh.

Graduate Student: You *have* been around for awhile!

The Clay Minerals Society
35th Annual Meeting

June 6-10, 1998, Cleveland, Ohio
Cleveland Marriott Downtown at Key Center

Workshop

Molecular Modeling of Clays (Saturday, June 6)

Organized by James D. Kubicki and William F. Bleam

Workshop Speakers

William Bleam (University of Wisconsin) & James Kubicki (Computer Sciences Corporation)
James Rustad (Pacific Northwest Laboratories)
Randy Cygan (Sandia National Laboratories)
Neal Skipper (University of London)
Edward Tipping (Institute of Freshwater Ecology - UK)
Biosym/MSI
Wavefunction, Inc.

Symposia

Molecular modeling of clays and clay surface properties
Clays in the petroleum industries
Smectite soils: nature, origin, and environmental problems
New developments in the geochronology of clays and clay-like materials
Remote sensing of clays

Field Excursions

Coastal and Bedrock Geology of Ohio's North Coast
Family field excursion to Kellys Island gigantic glacial grooves

Contact:

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www.cwru.edu/artsci/geol/files/cms.html

Cleveland, *continued from page 1*

Field trips are planned to study Coastal and Bedrock Geology of Northern Ohio, and the Gigantic Glacial Grooves of Kellys Island, Lake Erie.

Abstracts are due March 1, 1998.

For more information, contact Samuel M. Savin, Department of Geological Sciences, Case Western Reserve University, Cleveland, OH 44106; e-mail: sms7@po.cwru.edu; home page: www.cwru.edu/artsci/geol/files/cms.html

Ottawa, *continued from page 18*

The B-B-Q dinner brought about an appealing, and even somewhat adventurous expedition through the botanical grounds and arboretum of the campus, which were across the canal from the main campus area. The weather, after a few absolutely beautiful days of warm sunshine and blue skies, turned cloudy, and eventually a gently falling rain began as several groups of people walked to the unseen B-B-Q area. We strolled along a vaguely described route among open meadows and trees. The drizzle turned to a slightly harder consistency as we caught sight of the tent and ducked inside. As more folks arrived, the rain increased and we crowded further under the tent. The weather packed together the hearty and congenial crowd that evening, inducing a festive camaraderie... or was that the beer?

Eric Daniels
La Habra, California

Grant Application Deadlines

Student Travel Grant application deadline is **March 1, 1998.**
Student Research Grant application deadline is **April 1, 1998.**
Applications are available from the CMS Office.

Call for Bailey Award Nominations

The Bailey Award is the highest award of the Clay Minerals Society for scientific eminence as represented primarily by scientific publication of outstanding original research in clay science. Clay science is broadly defined for the purpose of the Bailey Award. Service to the Society, teaching and administrative accomplishments are not to be considered. The award is open to persons of all ages, nationalities and careers. Technical contribution to clay science is the sole criterion for the award. The award is not restricted to Clay Mineral Society Members. Previous recipients of the Clay Mineral Society Distinguished Member Award are not eligible.

Nominations should be accompanied with a letter of support, citing a list of important publications, and a narrative outlining the nominated individual's research contributions. Supporting letters of citation are also welcome. Nominations will remain anonymous and must originate from a Clay Minerals Society member in good standing. All documentation should be sent directly to the Chair listed below. The deadline for nominations is March 15, 1998.

Dr. Paul A. Schroeder
Bailey Award Committee Chair
Department of Geology
University of Georgia
Athens, GA 30602-2501 U.S.A.
phone: (706) 542-2384
FAX: (706) 542-2425
e-mail: schroe@gly.uga.edu

Individual Sustaining Members

Thanks to the growing number of Individual Sustaining Members: **Pat Costanzo, Dennis Eberl, Ross Giese, Steve Guggenheim, Phoebe Hauff, Bill Johns, Dave Pevear,** and **Ken Towe.**

Answers to Clay Names Quiz (page 26)

1. c
2. b
3. a
4. b (past USGS director)

Postdoctoral Position/Geochemistry/Univ. of Colorado at Boulder

The Department of Geological Sciences has an opening for a postdoctoral researcher to participate in a project to investigate the kinetics of clay growth from aqueous gels as a new methodology for creating a subsurface containment barrier. The candidate should have a Ph.D. in geology, chemistry, or related field with a focus on aqueous geochemistry and/or mineral growth at low temperatures. Research will be funded by the U. S. DOD through their Strategic Environmental Research and Development Program and will involve collaboration with researchers at Sandia National Laboratories and the University of Wisconsin/Madison. This one-year position will start in February and may continue for a second year depending on funding. Applications will be reviewed immediately, and the search will continue until the position is filled. A letter of interest, curriculum vitae, and three references (including phone numbers and e-mail addresses) should be sent to Kathryn Nagy, University of Colorado at Boulder, Department of Geological Sciences, Campus Box 399, Boulder, CO 80309-0399. E-mail: nagyk@spot.colorado.edu. The University of Colorado at Boulder is committed to diversity and equality in education and employment.

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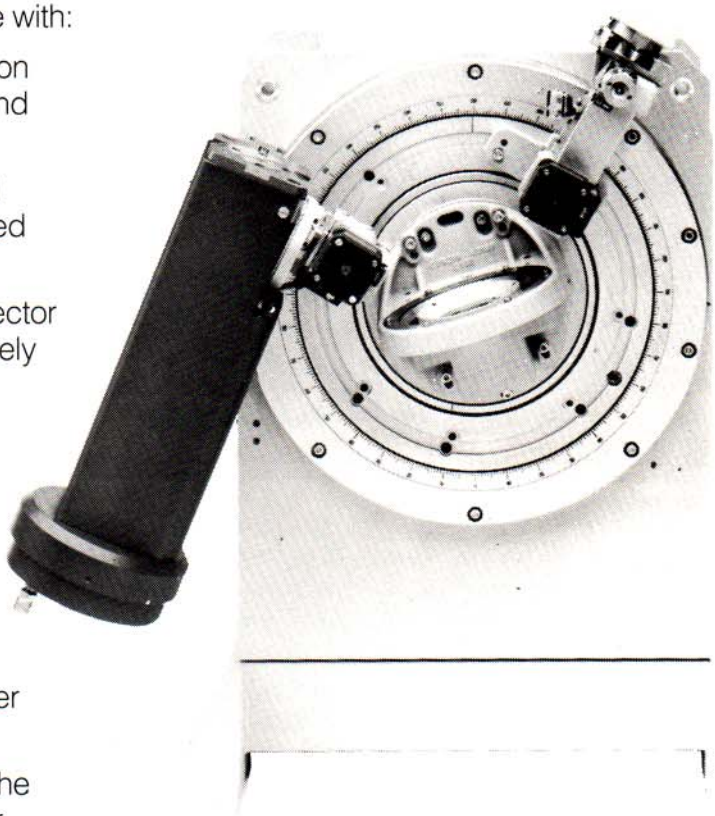

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Clay Names Quiz

(From the Namencloture Committee)
Answers from: Mitchell, R. S. (1979) *Mineral Names, van Nostrand, 229 p.*
Answers on page 24

1. LIMONITE is named for
   A. Bright yellow color of some varieties
   B. Canon Limon, Columbia
   C. Greek word for meadow
   D. Summertime beverage

2. PARAGONITE is named for
   A. Its similarity to Gonite
   B. Greek word for "to mislead," as it looks like talc
   C. Locality in Paragon region of Spain
   D. Discovery site near difficult Scottish golf course

3. CLINTONITE is named for
   A. DeWitt Clinton, railroad inventor
   B. DeBill Clinton
   C. Clinton Township, N.J.
   D. Occurence in "clints" in coal

4. PECORAITE is named for
   A. Similarity to dickite
   B. W. T. Pecora
   C. Don Peacor
   D. Greek word for "compact"

Archives

International Clay Conference Madrid 1972

Can anyone identify the people in this picture from back in the good old days when people could smoke in lecture halls? Please let the Society Office know. Thank you

Courtesy Bob Hall

MSA Grants

The Mineralogical Society of America announces: The 1999 Grant for Research in Crystallography from the Edward H. Kraus Crystallographic Research Fund with contributions from MSA membership and friends is a $3500 grant for research in crystallography. There are no restrictions on how the grant funds may be spent, as long as they are used in support of research. The only restrictions on eligibility for the grant are that the applicant must have reached his or her 25th birthday but not yet have reached his or her 36th birthday on the date the grant is given, and that the person is not a MSA Counsellor.

The 1999 MSA Grant for Student Research in Mineralogy and Petrology from an endowment created by contributions from the MSA membership is a $3500 grant for student research in mineralogy and petrology. Students, including graduate and undergraduate students, are encouraged to apply.

Selection will be based on the qualifications of the applicant, the quality, innovativeness, and scientific significance of the research, and the likelihood of success of the project. Grants will be made in January, 1999. Application forms for the grant may be obtained from the MSA worldwide web home page, http://www.minsocam.org or Dr. J. Alex Speer, MSA Business Office, 1015 Eighteenth St., NW, Suite 601, Washington, DC, 20036-5274, USA (phone: 202-775-4344, fax: 202-775-0018, e-mail: j_a_speer@minsocam. Completed applications must be returned to the MSA Business Office by June 1, 1998.

EUROCLAY '99

Conference of the European Clay Groups Association, Krakow, Poland, September 4 - 10, 1999

Contributions from all fields of clay science are welcome. They will be grouped into appropriate oral and poster sessions, depending upon submissions, or they will be included in the following symposia, intended to present overviews of specific topics, which will be organized by the conveners: 1. New techniques of clay research (Jean-Pierre Muller & M. J. Wilson); 2. Order-disorder features of clay minerals (Victor Drits & Robert C. Reynolds); 3. Crystal size analysis of clay minerals (Dennis Eberl & Francoise Elsass); 4. Hydrotalcites: synthesis, physicochemical properties and applications (Angelo Vaccari & Ewa Serwicka) ; 5. Surface modification of clay minerals and application of such materials (Faiza Bergaya & Gerhard Lagaly); 6. Illite and mica formation and transformation in continental environments (Dominique Righi & Arieh Singer); 7. Comparison between sea-floor and land-based basalt alterations: are these two processes and their secondary products that different? (Jose Honnorez & Suzanne Schmidt); 8. Low-grade metamorphism of sheet silicates (Martin Frey & Laurence Warr); 9. Clay minerals as tools in basin analysis (Norbert Clauer & Juraj Francu); 10. Clays in hydrocarbon reservoirs (Andrew Hurst & Paul Nadeau); 11. New developments in the traditional industrial applications of clays (Haydn Murray & Marek Tokarz); 12. Clay barriers and waste management (Kurt Czurda); Workshop: "Clays in the Environment," Banska Stiavnica, Slovakia, after the conference, combined with visits to Slovakian clay deposits and acid mine sites. Topics: Clays under acid conditions (M.J. Wilson, Michel Robert), Clay-toxic elements interactions (Edeltrauda Rybicka, Will P. Gates, Kurt Czurda), Clay barriers (Roland Push, Daniel Tessier). Contact: Mrs. Aka Srodon, Euroclay 1999, Institute of Geological Sciences PAN, Senacka 1, 31-002 Krakow, Poland; fax: 48-12-221609; e-mail: ndsrodon@cyf-kr.edu.pl; website: http://www.ing-pan.krakow.pl

Position Available

Knox College seeks to appoint an assistant professor of environmental studies, effective September, 1998. This is a newly created position designed to provide coordination and leadership for Knox's interdisciplinary program in environmental studies.

The new faculty member will be responsible for helping to further develop a program which currently draws staff support from the departments of biology, chemistry, economics, English, history, philosophy, psychology, and sociology/anthropology. It is anticipated that the successful applicant will help develop the current interdisciplinary minor in environmental studies into a full major. A Ph.D. is required; evidence of effective teaching and interdisciplinary interests is important. The area of specialization is open, but should include a combination of environmental science, earth/soil science, and/or physical geography with environmental policy. A successful applicant will have the ability to work effectively with faculty from a variety of academic disciplines, and be committed to strengthening environmental studies within the context of a selective liberal arts college that emphasizes faculty teaching and scholarship and undergraduate research.

Knox College, founded in 1837, is an independent, coeducational residential college in Galesburg, IL (pop. 35,000), located midway between Chicago and St. Louis. 1,100 students (15% minority) from 43 states and 34 countries study under the mentoring of 95 full-time faculty, 94% of whom hold the Ph.D. or equivalent degree. A founding member of the Associated Colleges of the Midwest, Knox offers the Bachelor of arts degree in 33 majors and programs. The 70-acre campus features excellent academic and residential facilities.

Send a letter of application and vita and arrange for three letters of reference to be sent to Professor Frank McAndrew, Chair, Environmental Studies search, Knox College, Galesburg, IL 61401. Review of applications will begin on February 1, 1998, and continue until an appointment is made.

In keeping with its 160-year commitment to equal rights, Knox College particularly welcomes applications from members of underrepresented groups.

Meeting Calendar

March 9-11, 1998, Orlando, Florida: SME Annual Meeting. Contact: Meetings Dept., SME, PO Box 625002, Littleton, CO 80162-5002, USA; Tel: 303-973-9550; fax: 303-979-3461; smemet@aol.com; http:smenet.org

March 26-27, 1998, Cambridge, UK: Mineral diagenesis and reservoir quality—the way forward. Sixth Cambridge Diagenesis Conference sponsored by the Mineralogical Society, Petroleum Exploration Society of Great Britain, London Petrophysical Society, and Geological Society. Contact: C.V. Jeans, Dept. of Earth Sciences, Downing Strret, Cambridge CB2 3EQ, UK. Tel: 01223-333400; fax: +44-1223-333450

May 3-6, 1998, Cincinnati, Ohio: 100th American Cermaic Society Annual Meeting. Contact: American Ceramic Society, PO Box 6136, Westerville, Ohio, 43086-6136, USA. Tel: 614-890-4700; fax: 614-899-6109; WWW: http://www.acers.org

May 18-20, 1998, Québec City, Québec: Joint meeting of the Geological Association of Canada, the Mineralogical Association of Canada, and the Association professionelle des géologues et des géophysiciens du Québec. Contact: Mme Agathe Morin, Département de géologie et de génie géologique, Université Laval, Pavillon Adrien-Pouliot, Sainte-Foy (Québec) G1K 7P4, Canada. Tel: 418-656-2193; fax: 418-656-7339; quebec1998@ggl.ulaval.ca; http://www.ggl.ulaval.ca/quebec1998.html

June 13-17, 1998, Cleveland, Ohio, USA: Clay Minerals Society Annual Meeting. Contact: Sam Savin, Dept. of Geological Sciences, Case Western Reserve University, Cleveland, Ohio. Tel: 216-368-6592; fax: 216-368-3691; e-mail: sms7@po.cwru.edu

June 29-July 1, 1998, Brisbane, Queensland, Australia: Australian Clay Minerals Society Conference. Contact: Ray Frost, Centre for Instrumental and Developmental Chemistry, School of Chemistry, QUT, PO Box 2434 GPO, Brisbane, Queensland 4001, Australia. Ph: 61 07 3864 2407; fax: 61 07 3864 1804; e-mail r.frost@qut.edu.au; homepage:http://www.sci.qut.edu.au/physci/conference/ACMS/

August 3-7, 1998, Colorado Springs, Colorado: 47th Annual Denver X-ray Conference. Contact: Manager, Schools & Conferences, International Centre for Diffraction Data, 12 Campus Blvd., Newtown Square, PA 19073-3273. Phone: 610-325-9814; fax: 610-325-9823; DXC@ICDD.COM

August 9-13, 1998, Boston, Massachusetts: 4th International Symposium on Environmental Geotechnology and Global Sustainable Development. Symposium Chairperson: Hilary I. Inyang. Contact: Dr. Vincent O. Ogunro, CEEST, Room E-114, University of Massachusetts Lowell, One University AVenue, Lowell, MA 01854 USA; Tel: 978-3185; fax: 978-934-4014; e-mail: vincent_ogunro@uml.edu

August 20-26, 1998, Montpelier, France: World Congress of Soil Science. Contact: 16th World Congress of Soil Science, Agropolis, Avenue Agropolis, 34394 Montpelier cedex 5, France; Tel: 33-67-04-75-38; fax: 33-67-04-75-49; isss@agropolis.fr; Server WWW: http://www.cirad.fr/isss.html

September 6-September 10, 1998, Brno, Czech Republic: 15th Conference on Clay Mineralogy & Petrology. Contact: Dr. Petr Sulovsky, Dept. of Mineralogy, Petrology and Geochemistry, Faculty of Science, Masaryk University, Kotlarska 2, 611 37 Brno, Czech Republic; phone +420-541129231; fax +420-541211214, +420-541123231; home page: http://www.sci.muni.cz/~sulovsky/15clays.html

October 18-23, 1998, Baltimore, Maryland, USA: SSSA Annual Meeting. Contact: SSSA, 677 South Segoe Road, Madison, WI 53711, USA.

October 26-29, 1998, Toronto, Ontario, Canada: Geological Society of America, Mineralogical Society of America. Contact: GSA, PO Box 9140, Boulder, CO 80301. Tel: 303-447-2020.

September 4-10, 1999, Krakow, Poland: Euroclay 1999. Contact Jan Srodon, Institute of Geological Sciences PAN, Senacka 1, 31-002 Krakow, Poland. Fax: 48-12-221609; e-mail: ndsrodon@cyf-kr.edu.pl

Corrections from last issue:
The 15th Conference on Clay Mineralogy and Petrology in Brno will be held from September 6-10, 1998.
The fax number for "Mineral Diagenesis and Reservoir Quality—the way forward" is +44-1223-333450.

XVth Conference on Clay Mineralogy and Petrology

The conference will be held on the campus of Masaryk University in Brno, Czech Republic, September 6 - September 10, 1998 under the auspices of the Ministry of the Environment with the participation of UNESCO/IUGS, International Geological Correlation Programme. The scientific program will cover all topics of theoretical and applied clay science. The principal themes of its proceedings will be: Clay mineralogy and petrology, Applied research of clay materials, Industrial applications of clay science, Clay minerals and the environment, Clays in soil research, The role of clay minerals in weathering (an IGCP #405 Workshop). Simultaneously, the Annual Meeting of all participants and interested scientists of I.G.C.Project 405—Anthropogenic Impact on Weathering Processes—will be held. The program of the conference will be complemented with multidimensional excursion(s) to Neogene clay deposits, Recent vineyards, and industrial enterprises utilizing clays, and social events for the participants and accompanying guests. Home page: http://www.sci.muni.cz/~sulovsky/15clays.html

1998 ICDD X-ray Clinics

- ICDD Clinic on X-ray Fluorescence Spectrometry: April 20-24 Fundamentals of X-ray Fluorescence Spectrometry; April 27-May 1 Advanced Methods in X-ray Fluorescence Spectrometry
- ICDD Clinic on X-ray Powder Diffraction: June 1-5 Fundamentals of X-ray Powder Diffraction; June 8-12 Advanced Methods in X-ray Powder Diffraction

Contact: Manager, Schools & Conferences, International Centre for Diffraction Data, 12 Campus Blvd., Newtown Square, PA 19073-3273. Phone: 610-325-9814; fax: 610-325-9823; CLINICS@ICDD.COM

Sustaining Member Profile

Thiele Kaolin Company

Thiele Kaolin Company is a privately held corporation that was founded in 1946 to mine and process kaolin for paper coating. Founders included W. F. Thiele, his son Paul F. Thiele, who is currently Chairman of the Board and Chief Executive Officer, and family friend Gorton T. Vorland. The origin of the company dates back to the 1930's when according to Paul Thiele, " My father was Chief Engineer at Consolidated Power and Paper Company, and in the early 1930's Peter Massey came into his office and said he had an idea for coating paper that would make the cost much more reasonable. His idea was to apply a clay coating on each side of the sheet on the paper machine using the same process as letter press printing. Consolidated decided to try the process and built a coater for the largest paper machine which they had at the time, #4 at Wisconsin Rapids. They were able to make a fine-coated, two-side sheet just about the time that *Life Magazine* was born. This paper, fast drying ink, and high speed color processes allowed *Life* to make a colorful news magazine available at low cost. You will recall, the early *Life Magazine* sold for 10 cents a copy.

"From that time on, my father was interested in the coating process and in the materials which were available for coating paper. In the middle 1940's, the possibility arose for the Thiele family to become part of a kaolin mining operation. We formed a company in 1946 and began operations in January of 1947 using a plant leased from and properties purchased from Burgess Washington Clays, Ltd."

In the first year of production, the company produced 60,000 tons of kaolin, all of which was sold to Consolidated, who had contracted with Thiele Kaolin Company to supply 100% of their clay in 1947. This contract was awarded to Thiele Kaolin Company and not to one of the three competing suppliers in Georgia, which included Georgia Kaolin Company, Edgar Brothers, and Southern Clays, for several reasons. One was that as a result of World War II, prices of all products in the U.S. were frozen. This price freeze was lifted in 1946, and the already established clay suppliers raised their prices from $12.00 per ton to $20.00 per ton for #2 coating clay. Consolidated felt that this large price increase was unreasonable and asked that the clay suppliers adjust their price increase to a lower amount. The companies refused, and Thiele was offered a "Total Requirement Contract" for #2 coating clay at $16.00 per ton and filler clay at $12.00 per ton. The other factor that helped establish Thiele Kaolin Company as a successful player in the industry was their commitment to the on-time delivery of a consistent, high-quality product at a reasonable price. The company continues to honor this commitment which has lead to continued growth and success in a highly competitive industry.

The first months of operation were challenging. Mr. Thiele recollects that first year: " And so on January 1, 1947, Thiele began operation with the people, the equipment, and the plant that Burgess Washington Clays put together. It was an exciting time. It rained almost every day in January 1947. Mining in the rain was messy and hard. The roads from the mine to town became most difficult to travel. It was impossible to get the school bus, the mailman, the clay trucks, and other traffic back and forth. At one point there was no road which could be used, so equipment was taken out on the road from Deepstep to Sandersville, and bad clay was pushed out of the road and good dirt was hauled from the mine to fill the hole, and dozers packed it down so that the road was passable.

"During the same month, a pocket of viscous clay became apparent at 3:00 o'clock one morning. It had to be located and isolated, as that small amount made a whole day's supply of raw clay too viscous to ship.

"The rain was so heavy it filled the waste pond and overflowed, washed out the dam, and sent clayey water down Limestone Creek. One landowner sued, stating that the creek had a 'ghostly and eerie appearance.'

"The truck drivers spent long hours trying to get enough clay into the plant to take care of the needs. Because of the broken axles on torn-up trucks, the truckers needed a little more money. When a small increase was granted, the men at the mine said they were having a rough time, too, and decided not to work until maybe they could get more money. It was suggested that this was an opportunity—if they wanted to use it, fine, if they didn't, we could all go home. It didn't take long for them to decide they wanted to continue working.

"Another problem that came up was that the press cloths did not hold up under the acid conditions of the clay slip and, consequently, were continually getting holes and cuts and had to be patched and replaced rapidly. At one time Mary Giles, Annie Hood, Frances Wood, and Alice Denning were making and patching press cloths.

"In any event, the first year was exciting. Each problem was solved as it

came up. Shipments were made to Consolidated very nearly on time. It worked because of the desire, dedication, knowledge, perseverance and tenacity of Malcolm Burgess, Owen Etheridge, Robert Billue, Aaron Denning, Farmer Golden, and over two hundred other wonderful people who worked here."

Since that first year, the company has grown to over 500 employees and now has operations in Washington and Glascock Counties, Georgia, Wisconsin Rapids, Wisconsin, and Helsinborg, Sweden, from which over a million tons of clay product are shipped to customers across the globe. Thiele's product line has expanded from 2 basic grades to over 20 basic grades sold for paper coating, paper filler, catalyst, paint filler and various miscellaneous applications. Thiele also custom blends to meet individual customer specifications.

From its inception, the company has kept pace with the needs of industry through acquisition of extensive reserves of both Middle Georgia coarse kaolin and East Georgia fine kaolin, new product development, and a strong commitment to research. Research and development is an integral part of Thiele Kaolin Company. The first "research department" was housed in a 5' x 6' laboratory adjacent to the washer mill. Bunny Thiele, Paul Thiele's wife, and Robert Billue ran this laboratory which was equipped with a blender and several other pieces of equipment. In the early years of the company, research focused on quality testing to determine if the clay products met customer specifications. As the company grew and resources became available, the focus was shifted to longer-term and more basic research. Fundamental questions such as what is a kaolinite particle and why does kaolin have the properties that it has were of great interest to Mr. Thiele. He understood that finding the answers to these and other questions could either make or break the company in the long run. His interest in and commitment to research stemmed, in part, from work that he had done at the Institute for Paper Chemistry in Wisconsin where he was employed as an engineer before moving to Georgia to run Thiele Kaolin Company. While at the Institute, he became familiar with electron microscopy. Mr. Thiele's exposure to electron microscopy gave the company an advantage over their more technically experienced competitors because he understood how to look at clay.

Prakash Malla, Owen Etheridge, Jr., Ed Riley, Paul Thiele, Sam Smith, Joseph Shi, Chip Malcolm, Jessica Elzea. Missing: Andy Lowe and Paul Kirschling. Courtesy J. Elzea

The Research and Development Department has grown from a one-room, two-person department to a very well-equipped, state-of-the-art, 16,000-square-foot laboratory with a staff of almost thirty. New product development, process improvement, and resource utilization continue to be the focus of research. Other technical departments that are critical to the success of the company are the Pilot Plant, Paper Laboratory, Process Engineering, and Technical Services. The future for companies that mine kaolin in Georgia is difficult to predict. At this time there are many new pressures on the industry, including competition from Brazil, more stringent product specifications, eroding market share due to the growing use of calcium carbonate, and dwindling reserves of high-quality paper-coating-grade kaolin deposits. The key to future success will be the ability to quickly adapt to a changing marketplace, which will ultimately require innovation and diversification into new markets. Another key to long-term success is the honesty and integrity of the people who make up the organization. Mr. Thiele recognizes that people are the most important part of the business and that the future of the company depends on the attitudes of the employees. Qualities such as open-mindedness, the ability to look forward, and dedication are critical to future success. These qualities have also provided the foundation for and sustained growth of the company. In this era of corporate downsizing, the idea that people are an important asset to the business sets Thiele Kaolin Company apart.

Jessica Elzea Kogel
Sandersville, Georgia

CMS Membership Application

To join the CMS, please send a copy of the application below, along with the required dues in U. S. funds, drawn on a U.S. bank, to The Clay Minerals Society, P.O. Box 4416, Boulder, CO 80306. Visa or Mastercard may also be used. Please include card number, expiration date, and name as it appears on the card. Subscribing members receive *Clays and Clay Minerals,* the journal of the CMS.

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Subscribing Member (Dues cover calendar year indicated, beginning January 1)—$60.00 _____

Subscribing Student Member (Must be countersigned by student's advisor)—$15.00 _____

Nonsubscribing Member—$30.00 _____ Calendar year (1998, 1999, etc.) _____

Publications available from the CMS

Prices include postage and are available to members of the CMS and MSA. **All others add $5.00 per volume.** To order, please send the required amount, in U.S. funds drawn on a U.S. bank, to The Clay Minerals Society, P. O. Box 4416, Boulder, CO 80306 USA. Mastercard and Visa also accepted. Prices and availability subject to change.

Electron-Optical Methods in Clay Science, CMS Workshop Lectures, Volume 2, Mackinnon & Mumpton, editors, **$21.00**
Thermal Analysis in Clay Science, CMS Workshop Lectures, Volume 3, Bish, Mumpton, & Stucki, editors, **$13.00**
Clay-Water Interface and its Rheological Implications, CMS Workshop Lectures, Volume 4, Güven & Pollastro, editors, **$18.00**
Computer Applications to X-ray Diffraction Analysis of Clay Minerals, CMS Workshop Lectures, Volume 5, Reynolds & Walker, eds, **$18.00**
Layer Charge Characteristics of 2:1 Silicate Clay Minerals, CMS Workshop Lectures, Volume 6, Mermut, editor, **$15.00**
Scanning Probe Microscopy of Clay Minerals, CMS Workshop Lectures, Volume 7, Nagy & Blum, editors, **$21.00**
Organic Pollutants in the Environment, CMS Workshop Lectures, Volume 8, Sawhney, editor. **$18.00**

Kaolin Genesis and Utilization, CMS Special Publication No. 1, Murray, Bundy, & Harvey, editors, (cloth) **$25.00**
Proceedings of the International Clay Conference 1985, Schultz, van Olphen, Mumpton, editors, (cloth) **$20.00 (formerly $64.00)**
Mica Polytype Slide Set, Prepared by Audrey C. Rule for the CMS, **$18.00**
Crystallography Slide Set, Symmetry Drawings of the Seventeen Plane Groups, Prepared by Audrey C. Rule for the CMS, **$35.00**

The Clay Minerals Society
P.O. Box 4416
Boulder, Colorado 80306
USA