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ASSOCIATION INTERNATIONALE POUR L'ETUDE DES ARGILES
INTERNATIONAL ASSOCIATION FOR THE STUDY OF CLAYS
INTERNATIONALE VEREINIGUNG ZUM STUDIUM DER TONE
МЕЖДУНАРОДНАЯ АССОЦИАЦИЯ ПО ИЗУЧЕНИЮ ГЛИН

newsletter N° 32 February 1996

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1. PRESIDENT'S REMARKS

The main activity of AIPEA in 1995 was a meeting of the 1993-1997 Council at the Euroclay '95 Conference in Leuven, Belgium this past August. The various clay groups around the world continue to be very active and we are looking forward to a very fine 11th International Conference in Ottawa, Canada to be held on the campus of Carleton University from June 15-21, 1997. The International Society of Soil Science and the Clay Minerals Society of the United States will meet in conjunction with AIPEA so it should be an outstanding meeting with a large attendance. It will also be the 34th Annual Meeting of CMS.

In 1995, I attended the annual meeting of the Clay Minerals Society in Baltimore, Maryland and the Euroclay '95 meeting in Belgium. Both were excellent meetings with many fine papers presented. The Council of the Clay Minerals Society voted to collect AIPEA dues for each of their members. At the Council meeting in Leuven, it was requested that the other clay minerals groups do the same and in this way we can have a better dues collecting structure for AIPEA and also maintain up-to-date mailing lists of our members.

In 1996, the AIPEA nominating committee will select names for officers and council members for 1997-2001. Also to be selected are AIPEA medalists and the recipient of the Bradley Award. Please write to me and suggest nominees for these positions and awards.

The Clay Minerals Group in Argentina is prepared to invite AIPEA to hold the 12th International Conference in 2001 at Bahia Blanca, Argentina. I had the opportunity to give a short course on industrial minerals at the University of the South in Bahia Blanca in May, 1995. The facilities at the University and the hotel accommodations in Bahia Blanca are adequate for the AIPEA conference. Also there are several good field trips that can be arranged in conjunction with this proposed meeting. The general assembly at the meeting in 1997 in Ottawa will select and vote on the site of the 2001 meeting.

In 1996, I plan to contact several clay companies in various parts of the world to contribute funds to support deserving students so that they can attend the 1997 meeting in Ottawa. Any AIPEA member who can, should also donate to this fund. You can send the money to Pam M. Huang, the Treasurer, Robert Schoonheydt, the Secretary-General, or myself. We need to build a sizeable fund to support deserving students so that they can attend the meeting and present their papers.

We are still waiting for the Proceedings of the 10th AIPEA Conference in Adelaide which was held over two years ago. We must do a better job in getting the proceedings of our international conferences published in a timely manner. This was a major issue discussed at the meeting of the Council in Leuven this past August.

I wish you all a great 1996 and I'll look forward to seeing many of you in Ottawa in 1997.

Haydn H. Murray

2. NEWS FROM THE AIPEA COUNCIL

The financial situation of AIPEA was the most important item discussed at the council meeting of August 21,1995 in Leuven at the occasion of Euroclay '95. The finances have not improved fundamentally since the Adelaide meeting of 1993. The annual fee must therefore remain at $7.50. Nevertheless, if the membership increases considerably, then a reduction of the fee may be possible. The only way to increase the membership is to convince the national clay groups to join AIPEA as affiliated societies. In that way all members of the national groups are automatically members of AIPEA. The Clay Minerals Society (USA) has accepted to do so, if the AIPEA fee is reduced by 50%. The council has accepted this proposal and extends an invitation to all other national clay groups to do the same. In the end AIPEA should become a society composed mainly of affiliated clay groups. The only problem is that the cost of running AIPEA is $5.00 per member and per year. A 50% reduction is less than $5.00. Council hopes that the increased membership compensates for that. In any case, the situation will be reviewed in 1997 during the Ottawa meeting.

3. AIPEA MEDALS

AIPEA medals were established by the general assembly of AIPEA to honour active clay scientists in recognition of their contributions to clay science. The following rules were established:

1) The AIPEA medals are established to award clay scientists for their outstanding contributions to the advancement of knowledge of clays and clay minerals. A maximum of two medals will be awarded every four years at the occasion of the International Clay Conference.
2) Candidates must be active clay scientists. Active means a minimum of three publications in refereed and internationally recognized journals in the two years preceeding the year of the international Clay Conference at which the medals will be awarded.
3) Candidates can be proposed by affiliated societies, by AIPEA members or by at least three individual AIPEA members. Candidates may submit their own application with their Science Citation Index.
4) Each application consists of:
   - the curriculum vitae of the candidate;
   - his/her list of publications of the last ten years
   - letters of support from those who propose the candidate.
5) The applications are judged by the AIPEA medal commitee consisting of the president (chairman), the vice-president, the past-president and four

members, three appointed by the council and one by the sponsoring company.

6) The applications must be submitted to the secretariat of AIPEA, from which all information concerning the AIPEA medals can be obtained. The closing date of submission of candidates is November 1, 1996.

4. 1997 BRADLEY AWARD

The Bradley award will be presented during the 11th International Clay Conference in Ottawa. The closing date for submission of manuscripts is November 1, 1996. All correspondence must be addressed to Prof. Robert Schoonheydt, secretary-general AIPEA, Center for Surface Chemistry and Catalysis, K.U.Leuven, Kardinaal Mercierlaan 92, 3001 Heverlee, Belgium
All AIPEA members should encourage entries of high quality. You are therefore requested to circulate the regulations and the application form among possible candidates.

Rules

1. The objective of this award is to offer financial assistance to the recipient to enable him or her to participate in an International Clay Conference for the purpose of presenting his or her paper.
2. Candidates must submit five copies of a paper of approximately 4000 words in English, French, German, Russian or Spanish on a topic relevant to one of the sessions at the Conference. Papers written in a language other than English must be accompanied by an extended summary of not less than 1000 words in English. The paper should be written in a format acceptable for international journals. Assessment will be on scientific content only and the winning entry shall form the substance of a paper to be presented by the successful candidate at the Conference to which the award relates.
3. The award will normally be made at four-yearly intervals and initially will not exceed 1000 $, although the value will be reviewed from time to time. An award shall not be made if it is considered that candidates do not reach the required standard.
4. Persons eligible for the award shall be under 35 years of age on the closing date for submission: no restriction is placed on the sex or nationality of the candidate or the nature of his or her employment. Every application must be supported by two members of AIPEA.
5. The selection committee shall consist of the President of AIPEA and four members nominated by the Council of AIPEA. The paper must be in the hands of the selection committee at least six months before the Conference to which it relates.
6. A suitably inscribed certificate will be presented to the successful candidate during a plenary session to be followed by the oral presentation of the winning paper. A portion of the prize may be sent to the successful candidate in advance in the form of a ticket enabling him or her to travel to the Conference.
7. The attached form must be completed and returned with each entry to arrive before the official closing date (see end of newsletter). The candidates must note that the deadline will be strictly observed.
8. The winning paper must be submitted for publication in the Conference proceedings.

5. TEACHING COMMITTEE

A symposium on Teaching Clay Mineralogy is being planned at the 11th International Clay Conference. Themes being developed are

1) Modern Methods of Teaching Weathering Processes in the Field and Laboratory,
2) Clay Mineralogy as a Medium for Helping Public School Educators Teach Science.

Contributions to these themes and to other aspects of teaching clay mineralogy are invited. Both oral and poster presentations are welcome. Please send me a copy of your title and preferred mode of presentation if you are interested in contributing a paper. A prompt response is suggested because invited papers are being solicited too.
Teaching clay mineralogy is often combined with other subjects such as soil chemistry in graduate college courses and applied clay mineralogy relating to drilling fluids and correction of environmental problems. Contributions from these areas are welcome too.

Teaching Clay Mineralogy Committee
Kazue Tazaki,
Joe B. Dixon, Chairman

6. NOMENCLATURE COMMITTEE

DEFINITION OF CLAY AND CLAY MINERAL:
Joint Report of the AIPEA and CMS Nomenclature Committees

S. Guggenheim, Chairman of the AIPEA Nomenclature Committee, Dept. of Geological Sciences, University of Illinois, Chicago
The other members are A. Alietti (Italy), V.A. Drits (Russia), M.L.L. Formoso (Brazil), E. Galan (Spain), H.M. Köster (Germany), D.J. Morgan (England), H. Paquet (France), T. Watanabe (Japan) and ex officio members D.C.Bain (Editor, *Clay Minerals*) and R.E. Ferrell (Editor, *Clays and Clay Minerals*).

R.T. Martin; Chairman of the CMS Nomenclature Committee, Ardaman and Associates Inc.,8008 Orange Ave, Orlando, FL 32859.
The other members are: D.L. Bish, D.S. Fanning, S. Guggenheim, H. Kodama, F.J. Wicks

Introduction

The definition of "clay" was first formalized in 1546 by Agricola. It has been revised many times since, although the fundamentals involving plasticity, particle size, and hardening on firing were retained by most. For an exhaustive account of the history of the definition to 1963, the reader is referred to Mackenzie (1963). More recent developments may be found in Weaver (1989).
The definition of clay raises the important issue of clay constituents and, implicitly, the definition of "clay mineral". Mackenzie (1963, p15) noted the inappropriateness of defining clay minerals as "any minerals which occurs in clay" since, among several reasons, it would include many accessory minerals that are not characteristic of clay. Previous definitions of "clay mineral" (e.g., Bailey, 1980) simply equated clay minerals to phyllosilicates, thus endorsing the use of a term without apparent justification. The terms "clay mineral", however, is useful when applied in context to clay constituents. The approach of equating "clay mineral" to phyllosilicate fails to consider the relationship of the properties of the bulk clay with the properties of the constituents of clay. This inconsistency is addressed here in part, without making major changes to current usage.
Weaver (1989, p5) noted an additional complication: the conceptual problem of combining particle size requirements of clay constituents with mineralogy. Because the term "mineral" has a precise definition that does not include particle size, it follows that the definition of a mineral group cannot be based on particle size.
Both the nomenclature committees of AIPEA and CMS started work on the definitions of clay at the same time, and it became clear that a more acceptable result would be obtained if the two committees joined efforts. This report represents the recommendations of both committees.

Clay

Definition

The term "clay" refers to a naturally occurring material composed primarily of fine-grained minerals, which is generally plastic at appropriate water contents and will harden when dried or fired. Although clay usually contains phyllosilicates, it may contain other materials that impart plasticity and harden when dried or fired. Associated phases in clay may include materials that do not impart plasticity and organic matter.

Discussion

The "naturally occurring" requirement of clay excludes synthetics. Based on the standard definition of minerals, clays are primarily inorganic materials excluding peat, muck, some soils, etc. that contain large quantities of organic materials. Associated phases, such as organic phases, may be present (see below for further discussion relating to associated phases). "Plasticity" refers to the ability of the material to be molded to any shape. The plastic properties do not require quantification to apply the term "clay" to a material. The "fine-grained" aspect cannot be quantified, because a specific particle size is not a property that is universally accepted by all disciplines. For example, most geologists and soil scientists use particle size less than 2μm, and colloid chemists use 1μm for clay particle size. Sedimentologists may use the term "clay" also to denote grain size only. It is more precise, however, to give the actual dimensions of the particles, e.g. particles less than 4 μm.
Plasticity is a property that is greatly affected by the chemical composition of the material. For example, some species of chlorite and mica can remain nonplastic upon grinding macroscopic flakes even where more than 70% of the material is less than 2μm esd (equivalent spherical diameter). In contrast, other chlorites and micas become plastic upon grinding macroscopic flakes where 3% of the material is less than 2 μm esd.
Plasticity may be affected also by the aggregate nature of the particles in the material. For example, many "glauconite sands" are composed of ("sand size") grains of aggregates of fine-grained glauconite crystallites. Although the material may be plastic, they apparently contain no fines based on a standard grain size analysis. Clearly, such glauconite sands are composed of aggregates of clay. In contrast, many "flint clays" are greater than 95% kaolinite, yet they are nonplastic in their natural state and contain aggregate particles only greater than about 75 μm in size. Although the aggregates are composed of fine-grained kaolinite, plasticity is minimized because of the aggregate nature of the kaolinite crystallites. Thus, "flint clays" are an apparent exception to the plasticity attribute of the definition. The term "fine-grained" in the above definition refers to crystallite size and not to aggregate size.
Although the primary minerals composing clays are phyllosilicates, other materials that impart plasticity and harden upon drying or firing may comprise clays (see definition for "clay mineral" below). Associated phases in clay (not to be referred to as "associated clay phases", but as "associated phases in clay") may be minerals such as quartz, calcite, dolomite, feldspars, oxides, hydroxides, organic phases, etc. or noncrystalline phases, such as colloidal silica, iron hydroxide gels, organic gels etc.

Clay Mineral

Definition

The term "clay mineral" refers to phyllosilicate minerals and to minerals which impart plasticity to clay and which harden upon drying or firing.

Discussion

Currently, minerals known to produce the property of plasticity are phyllosilicates. Because minerals are not defined based on their crystallite size, appropriate phyllosilicates of any grain size may be considered "clay minerals". Likewise, clay minerals are not restricted, by definition, to phyllosilicates. If research reveals that a non-phyllosilicate mineral imparts plasticity to a clay and hardens upon drying or firing, this mineral is a "clay mineral". For example, if an oxy-hydroxide mineral in a clay shows plasticity and hardens upon drying or firing, it may be properly referred to as a "clay mineral". Thus, a clay is not required to be predominantly composed of phyllosilicates. Minerals that do not impart plasticity to clay and non-crystalline phases (regardless if they impart plasticity or not) are either "associated minerals" or "associated phases", respectively.

This definition departs from previous definitions (e.g. Bailey, 1980) of clay minerals, where clay minerals were equated to phyllosilicates. The current definition broadens that scope of possible minerals defined as clay minerals. In addition, it specifically relates the property of plasticity and hardening upon drying or firing, which is basic to the definition of clay, to the definition of clay mineral. The definition of "clay mineral" includes all phyllosilicate minerals previously regarded as clay minerals and possible new clay minerals as discussed above.

References

- Bailey, S.W. (1980) Summary of recommendations of AIPEA Nomenclature Committee.
  Clays and Clay Minerals, 28, 73-78.
- Mackenzie, R.C. (1963) De Natura Lutorum.
  Clays and Clay Minerals, v. XI, Proceedings of the Eleventh National Conference on Clays and Clay Minerals, Pergamon Press, 11-28.
- Weaver, C.E. (1989) Clays, Muds and Shales. Elsevier, Amsterdam, 819 p.

7. THE 11th INTERNATIONAL CLAY CONFERENCE

THE 34TH ANNUAL MEETING OF THE CLAY MINERALS SOCIETY

June 15-21, 1997, Carleton University, Ottawa, Ontario, Canada

Symposia

1. Mössbauer Spectroscopy in Clay Science: Fundamental Aspects and Application to Current Topics.
   Convener: D.G. Rancourt (University of Ottawa)

2. The isotopic geochemistry of clay minerals.
   Convenor: F.J.Longstaffe (University of Western Ontario)
3. Multinuclear Magnetic Resonance of Clays
   Convenors: C. Detellier (University of Ottawa), J.A. Ripmeester (National Research Council of Canada)
4. Microbial Geochemistry of Clay Minerals
   Convenor: G. Ferris (University of Toronto)
5. Clay Barriers and Waste Management
   Convenor: D. Oscarson (Atomic Energy of Canada Limited)
6. Hydrothermal Clays in Modern and Ancient Seafloor Deposits
   Convenor: D.E. Ames (Geological Survey of Canada)
7. The Merits of TEM and XRD as applied to Layer Silicates
   Convenors: H. Vali (McGill University), R.F. Martin (McGill University)
8. Clays in Industry
   Convenor: H.J. Abercrombie (Geological Survey of Canada)
9. Teaching Clay Mineralogy (tentative title!)
   Convenor: J.B. Dixon

Other Scientific Programs

Special and general sessions will be organized on a range of topics, depending on responses. The topics proposed are:

1. Clays in soil mechanics and rheology
2. Clays, agriculture and the environment
3. Charge characterization of phyllosilicates
4. Oxide minerals in sediments and soils
5. Crystal chemistry and structure
6. Colloidal properties and surface chemistry
7. Geology and sedimentology
8. Genesis and synthesis
9. Applied clay mineralogy
10. Poorly crystalline and accessory minerals
11. Investigational techniques
12. Other (please specify on the preliminary registration form).

Workshop

A pre-conference workshop is planned on Saturday, June 14, 1997.

Title: Synchrotron X-ray Methods in Clay Science
Organizers: Darrell G. Schulze (Purdue University)
Joseph W. Stucki (University of Illinois)

Field Excursions

Planned field excursions are as follows:

1. *Canadian Rocky Mountains - geology and mineral deposits (3 days)*

This excursion provides a transect via Calgary - Lake Louise - Fernie - Calgary to examine Rocky Mountains geology, including hot springs, Burgess Shale and deposits of talc/magnesite/dolomite, zeolites, bentonite, and oil shale.

2. *Sudbury mining district, Ontario (2 days)*
   This excursion tours a nickel mine, the research facilities of the Ontario Geological Survey, and mineral occurrences in and around the Sudbury impact basin.
3. *Clay minerals of the St. Rémi area, Quebec (1 day)*
   This excursion examines the St. Rémi China clay quarry, Ste. Agathe podzolic soils, and occurrences of brucite and phlogopite.
4. *Clay minerals of the Stanleyville area, Ontario (1 day)*
   This excursion examines occurrences of corrensite, aliettite, smectite and jarosite
5. *Paleoweathering and attendant mineral alteration along the Precambrian Paleozoic unconformity, Ontario (1 day)*
   The excursion visits the Madoc talc quarry, Marmoraton iron mine and a wollastonite occurrence, to examine the effects of paleoweathering on these deposits.
6. *Classic mineral localities in the Bancroft area, Ontario (1day, 2days with excursion 5)*
   The excursion visits the Princess Quarry (sodalite), the Macdonald mine (microline, plagioclase, feldspar), Quadeville Mines (beryl, rose quartz), and other mineral localities, if time permits.
7. *Landslide and soil development in the Champlain Sea sediments of the Ottawa area (1day)*
   This excursion examines: (a) quick clay landslides in post-glacial marine clays, (b) smectite in Ae horizon of podzolic soils,(c) formation of pedogenic imogolite, and (d) typical soil development on a wide textural range of marine sediments.
8. *Thetford mines and the St. Lawrence Lowlands, Québec (2days)*
   This excursion takes participants to mineral occurrences (talc, serpentine, chrysotile, brucite, etc) in the Thetford Mines asbestos region. Bentonite and landslide occurrences in the St. Lawrence Lowlands will be visited on the way to or from Thetford Mines.
9. *Paleosols and climate change in the Upper Paleozoic of maritime Canada (2 days)*
   This excursion visits primarily Carboniferous alluvial sequences in which paleosols (calcrete, vertisols, and coals with seat earths) record arid to monsoonal climate changes.
10. *Georgia kaoline deposits in Macon, Georgia (2 days)*
    This excursion visits (a) localities where halloysite and kaolinite have developed from weathered granite, (b) deposits of Cretaceous fresh water ordered kaolinite, and (c) Tertiary-age marine disordered kaolinite.

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8. EUROCLAY

298 scientists from 36 countries gathered on a sunny Sunday afternoon of August 20, 1995 for the opening ceremony of EUROCLAY'95 in Leuven. Wellcome addresses were give by the chairman of the organizing committee, Prof. R. Schoonheydt, and by the president of the European Clay Group Association, prof. R. Kühnel. Their addresses are given below. A new type of organization of the conference was proven to be highly successful. The opening ceremony was held on Sunday afternoon with a special guest speaker, Prof. J.J. Fripiat. This was followed by an open air welcome reception. Each day was organized around two specific themes with one invited speaker and one oral presentation, one in the morning and one in the afternoon. The remaining morning and afternoon times were devoted to posters of the themes of the day. Posters were put up in the historical building of the university hall for one day and could be studied in the morning and in the afternoon. Refreshments were available during the poster sessions. This gave a very relaxed conference. The abstracts of all lectures and posters (265 in total) are combined in the book of abstracts, which is still available at the price of $75.

Opening Address of R. Schoonheydt, Chairman organizing committee
On behalf of the organizing committee of Euroclay '95 I would like to express a special wellcome to professor Ratko Kühnel, president of the European Clay Group Association, to Dr. Haydn Murray, president of the Association Internationale pour l'Etude des Argiles, Prof. Elen Roaldset, vice-president of AIPEA and to Dr. José Serratosa, former president of AIPEA. Our wellcome goes also to the Katholieke Universiteit Leuven, for the beautiful historical buildings. I also wish to thank the sponsors, with some of their representatives present in the audience: COST Chemistry Programme of the European Union, The National Fund of Scientific Research of Belgium, both its Flemish and French section, The International Science Foundation, EXXON, Dow, The Leuven Clay Processing Group, Redco, Promat International and the Studiecentrum voor Kernenergie. Finally my greetings go to all of you, 298 clay scientists from 36 different countries.
From Dresden '91 to Leuven '95 only four years have elapsed, but an extraor-

dinary change has occurred in Europe. Remember Dresden '91: the meeting occurred right after, what the Germans call "Die Wende", the turn-over of the regime. Now, Eastern Germany is integrated in the greater Germany; Eastern Europe has become a mosaique of independent countries, actively looking for their place in Europe and in the world. The former Yugoslavia is a scattered place, which reminds us of the fact that the "European idea", that is a Europe with a myriad of different peoples keeping their identity and living in peace, but working together towards a better future for all, that European idea has still a long way to go. Yet, it is the only possible way.

European Clay Scientists were among the first to put this European idea into practice. Already in the early seventies the European Clay Conferences were created with scientific meetings between the Belgian and Spanish Clay Societies. The idea rapidly expanded and was successfully repeated. Many of you remember Strasbourg, Oslo, Prague, Sevilla, Dresden and I hope that, at the end of the week, you bring good memories of Leuven to your home countries. In the eighties the next step towards integration of European clay science was made by setting up "Clay Minerals": the European Journal of Clay Science; or the European counterpart of Clays and Clay Minerals from the Clay Minerals Society of America. This was a major and a successful step, because the national clay groups had to give up their own journal. The success of Clay Minerals proves that the right decision was made at that time. Finally, in a third move the European Clay Group Associations was created eight years ago. It is the right time and place to remind you of the names of professor Veniale, the first president of ECGA and Professor R. Kühnel the second president, both men with a true European vision, as so many others: one of them was the organizor of the Oslo meeting and one of the founding fathers of AIPEA: Professor Rosenqvist. He passed away in 1994. Let him be an example for the younger generation.

Three ideas were at the basis of EUROCLAY '95.

(1) The emphasis was put on clay minerals as materials, with a large number of applications in industry and with an even larger number of possible applications, most of them unexplored today. That is the reason for the subtitle of the conference "Clays and Clay Material Science" and for scientific sessions on synthesis, advanced materials, pillared clays, colloids, clay catalysts and clays for waste disposal.

(2) EUROCLAY '95 was set up as a European meeting The organizing committee has tried to get scientists from all European countries in Leuven. We succeeded to a large extent, although not entirely. It was, I must confess, a difficult job. I suggest that the Council of the European Clay Group Association discusses this point during its meeting this week.

(3) The third idea is that "**science, and certainly clay science, is fun**". We have to enjoy it, keep stress to a minimum. So we tried to develop the concept of an easy going conference. The meeting is spread over four days; no parallel sessions are organized. The oral presentations are only

invited lectures followed by one paper. All the other papers are organized in poster sessions. The poster sessions are thematic and posters are put up for one day. You can visit the posters in the morning from 10.30 am to lunch time to have an overview and in the afternoon from 3.30 pm on for specific discussions. The success of this meeting largely depends on you, clay scientists: on behalf of the organizing committee I thank you for having submitted a large number of excellent abstracts. I thank you for being in Leuven and I hope you enjoy the science offered by your colleagues, that you enjoy Leuven, the Flemish and French regions of this unique country Belgium.

May I call now upon Professor Radko Kühnel, president of the ECGA, to formerly open Euroclay '95

Opening Address of the EUROCLAY '95 in Leuven

It is a great honour and my great pleasure to open the European Clay Conference EUROCLAY '95 today, here at the University of Leuven. On behalf of the European Clay Groups Association I welcome you all, members of the Association, Colleagues beyond the European Union, all accompanying members and all organizers of this meeting.

Four years after the conference in Dresden in 1991, we became younger due to many young newcomers which have joined the big European Family of clay scientists in European countries. Our young Association which was founded in 1987 in Sevilla reacts on the recent rearrangements in Europe. The Council of the Association is trying to contact and involve clay scientists from newly formed countries. Some of them are already with us.

There are two distinct trends in Clay Science in the world and in Europe in particular:

1) The intensity of clay research increases and large potential fields of clay application are opened. The environmental care seems to be a new challenge for clay science.

2) International cooperation grows, as far as the large and responsible tasks can be solved only by larger and mulidisciplinary teams. These two trends are clearly reflected in the program of this meeting.

Not all of our friends and co-workers could join us today. We are missing Professor Rosenqvist and Professor Szpila, excellent teachers and scientists who have been working up to the last hour of their life. Allow me to ask you for a minute of silence for their memory. Thank you.

During the oral and poster sessions, the harvest of clay research will be presented. I wish you good luck in finding the grain you are looking for and/or in finding suitable counterparts for a future cooperation. I wish you all an enjoyable time in Leuven.

With this I declare the Euroclay 1995 open.

Dr. Radko Kühnel, President of ECGA

9. NEWS FROM THE CLAY GROUPS

China

The 50th Anniversary Commemorative Meeting of the Chinese Ceramic Society was held on Oct. 9, 1995, in Beijing. About 400 participants from different provinces, research institutes and colleges, and many foreign guests from U.S.A. and Japan attended the meeting. On the same day, the China's Mineral Potential Conference was held in Swiss Hotel, Beijing. This Conference was organized by the Editorial Committee of " Industrial Minerals " (London) and the China National Non-metallic Minerals Industrial Import & Export Corporation. The Conference was headed by Dr. Mike O'DRISCOLL and Chief Engineer YU, Yangtang. About 240 participants attended the Conference. Among them, 106 were foreign participants from 26 countries and districts. From Oct. 9th to 10th, the scientific programme offered 16 oral presentations. Papers about clay minerals industry were:

- The Resources of Refractory Materials of China (LIU, Hongquan).
- The Development of Refractory Materials (ZHONG, Xiangchong).
- Chinese Ceramics and Superfine Processing Method of Refractory Materials (JIN, Jiming).
- The Usage of Zircon in Chinese Ceramic Industry (POWELL Mary).
- The Production of Ceramic tiles in Asia and the Prospect of the Markets (GUAN William).
- Talc of China (Harrison Richard B.).
- The Production and Utilization of Micaceous Powder in China (CHEN, Shuanjiang).
- The Development of the Nonmetallic Minerals Industry in China and the Demand for the Mineral Resources (LI, Boyin).
- The Study of Special Processing Method of Chinese Kaolin in Recent Years (YAO, Shaode).

Zhi ZHENG

Clay Minerals Group of the Mineralogical Society

Committee

The Committee elected for 1995 was Harry Shaw (Chairman), Ian Wilson (Secretary), John Adams (Treasurer) and Derek Bain (Principal Editor - Clay Minerals) and other members Chris Breen, Tony Fallick, Jenny Huggett, Richard McCabe, Tony Milodowski and Paul Reid. Andrew Parker served as the Group's representative on the Mineralogical Society's Council.

Meetings in 1995

"Industrial applications of clays" was the theme of the 1995 Spring Meeting held in St. Austell on the 5-6th April. The meeting was a joint meeting with the Applied Mineralogy Group and was supported by ECC International Europe - thanks is given to the Managing Director of ECC International Europe, Dr. Clive Gronow, for permission to visit the plant and laboratory facilities in Cornwall. The meeting was organised by Ian Wilson and John Adams and was attended by 80 people. 25 papers were presented covering a wide range of industrial uses in environmental applications, paint, rubber, plastic, paper, catalysts, bricks and cement. Invited speakers were Stephen Boyd (Michigan State University), Emilio Galan (Sevilla University) and Ron Ottewill (University of Bristol). A dinner was held in the Carlyon Bay Hotel with guests piped to table by a Cornish bag-piper.

"Clays: Characterisation, Cation Exchange and Catalysis" was the theme of the Autumn Conference of the Group and was held at The University of Central Lancashire, Preston and was organised by Richard McCabe. A very successful meeting was enjoyed by all with guest speakers Tom Pinnavaia (Michigan) and James Clark (York University)

Meetings Planned for 1996

"Research in Progress" - meeting will be be held on the 1-2 April, 1996 at Sheffield Hallam University and will be organised by Chris Breen who may be contacted at the Materials Research Institute, Sheffield Hallam University, Sheffield S1 1WB, England. Tel. (0114) 253 3500, Fax. (0114) 253 3501, e-mail c.breen@shu.ac.uk. The intention is that the papers at this meeting will be presented primarily by research students and postdoctoral research assistants and the group will contribute towards the travel and accommodation costs.

"Environmental Interaction of Clay Minerals". This meeting will be held at the University of Reading on the 14-15th November, 1996 and will be organised by Andrew Parker and Joy Rae - please contact them for further information at the Postgraduate Institute for Sedimentology, University of Reading, Whiteknights, P.O.Box 227, Reading, RG6 6AB, England. Tel. (01734)318 944, Fax (01734)310 279, Telex 847814 RULIBG

For any further information on the Clay Minerals Group of the Mineralogical Society please contact the Secretary, Ian Wilson, Production Department, ECC International Europe, John Keay House, St. Austell, Cornwall, PL25 4DJ, England. Tel. (01726) 623253, Fax. (01726) 623019.

Ian Wilson
Secretary, Clay Minerals Group

Clay Minerals Society (United States)

The Clay Minerals Society's 32nd annual meeting was held at the Omni Inner Harbor Hotel in Baltimore, MD on 3-8 June 1995. The George W. Brindley Lecture was presented by Dr. Gerhard Lagaly, Kiel University, and entitled "Delaminated clay minerals". Dr. David L. Bish, Los Alamos National Laboratory, received the Jackson Mid-Career Clay Science Award and presented a lecture entitled "Modern structural studies of clay minerals: Have there been any surprises?". Dr. Rustom Roy, Pennsylvania State University, presented the Pioneer in Clay Science Lecture on *"Malleo et Mente et Catino*: The role of synthesis in mineralogy, including clays", which combined an overview of his past work on clay minerals with the future of funding in the sciences. Dr. William D. Johns, University of Missouri, was awarded the Distinguished Member Award.

The General Sessions had 114 papers, including 26 posters. Special Sessions included the following Symposia :

- Environmental transformations: organic pollutants (8 papers)
  inorganic contaminants (9 papers)
  physical and structural phenomena (8 papers)
- Crystal structures of clay minerals (6 papers)
- Development of clay minerals under variable chemical conditions (5 papers)
- The source clays (CMS clay standards project) (7 papers)
- Clay mineral formation and alteration (7 papers)
- One hundred years of X-rays (5 papers)
- Chemistry and thermodynamic properties of clay minerals (6 papers)
- Industrial applications of clays (15 papers)
- Smectite to illite transformation (6 papers)
- Clays in shales and sandstones (6 papers)
- Poster session: various topics (26 papers)

The field trip left Thursday morning and returned the same evening. The trip covered the clays and clay minerals in soil-geological columns of the Piedmont and Inner Coastal Plain. The pre-meeting workshop was on the reactions of organic pollutants with clays. The workshop notes will be published as CMS Workshop Lecture Series, Volume 8: Reactions of Organic Pollutants with Clays. The chapters cover sorption of organic compounds using a surface functional approach, sorption and desorption reactions, organozeolites and the removal of organic contaminants from water, organic contaminant transport through clay liners and slurry walls, substrate limitations in bioremediation removal rates and extents, and spectroscopic methods for characterizing surface-sorbed organic contaminants: application of optical and electronic measurements.

The recently published Volume 7, Scanning Probe Microscopy of Clay Minerals, K.L. Nagy and A.E. Blum, Eds., is now available from the Society Office. Chapters include high resolution scanning probe microscopy: tip-surface interaction, artefacts, and applications in mineralogy and geochemistry, atomic and molecular scale imaging of layered and other mineral structures, mineral-water interactions: fluid cell applications of scanning force microscopy (SFM), determination of illite/smectite particle morphology using SFM, and applications of morphological data obtained using SFM to quantification of fibrous illite growth rates. The price is $18 plus postage ($3) from the Society Office. In addition, special publication No.1, Kaolin Genesis and Utilization, is available at $20 plus postage ($3).

The next annual meeting will be held in Gatlinburg, Tennessee, USA at the Park Vista Hotel, Great Smokey Mountains National Park, from 16-20 June 1996. The workshop, on 15 June, is entitled: "Isotope geology of clay minerals: From isotope crystal chemistry to petrogenesis" and is being organized by T.K. Kyser and F.L. Lonstaffe. The field trip is entitled "Soils and geomorphology of Valley and Ridge Province". S.Y. Lee, Oak Ridge National Laboratory, is the General Chair, and C. Mora, University of Tennessee, and P. Bertsch, Savannah River Ecology Laboratory (University of Georgia) are the Technical Program Chairs. Inquiries may be addressed to S.Y. Lee, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6038 USA, tel: 615-574-7359, fax: 615-576-8646, e-mail: SYL@ORNL.GOV.

S. Guggenheim

Czech and Slovak National Clay Group

The Czech group organized two seminars in the year 1995. Both of them took place in Prague. The first one was held in the building of Geology at the Faculty of Science of Charles University; the second in the seat of K-service/ Ceramic Service / Prague 6 - Nebutica. The spring seminar, held on March 17, had the following program:

- Konta J. : Present Trends in Argilology
- Votinsky J.: Origin, Structure, some Properties and Use of Intercalates
- Weiss Z.: Clay Minerals modified by Intercalation

At the autumn meeting of December 14, the following lectures were given:
Banska Stiavnica, Slovakia - Shrbené B.: Production of Clay Raw Materials in the Czech Republic compared with the world trends

- Melka K.: Information on Euroclay '95

Proceedings of the XIIIth Conference on Clay Mineralogy and Petrology, held in Prague in 1994 and edited by Karel Melka, were published by the Editorial

House of Charles University, Prague in December 1995
The Slovak part of the Czech and Slovak National Clay Group is preparing the 14th Conference on Clay Mineralogy and Petrology, Slovakia. This meeting will be held during September 2-6, 1996 in the historical mining town Banska Stiavnica. Themes are

- Geological, Mineralogical and Chemical Aspects of Clays and Zeolites
- Theory, Research and Applications in Industry and Environment.

All correspondence should be addressed to Sucha Vladimir, Department of Geology and Mineral Deposits, Comenius Univ., Mlynska dolina G, 842 15 Bratislava, Slovakia. Fax 42-7-729-064.

The Slovak group organized three meetings in the spring with the following contributions:

- Schwarz J. Syracuse University: Proton Affinity Distribution on Hydrated Oxide Surfaces
- Schall N., Süd-Chemie: Industrial Applications of Bentonites
- Heller-Kallai L., Hebrew University: ClayVolatiles and Condensates. A Review

In the autumn F. Veniale, University of Pavia, gave a lecture one the leaning tower of Pisa.

Melka K., Kraus I.

Groupe Français des Argiles

1995 Meeting

- The spring meeting was held on March 23 in Paris. There was no particular theme for this meeting. It was devoted to young researchers (Ph.D. thesis students). Their travel fees were financially supported by the French Clay Group. This was very successful: 14 oral presentations covered a wide range of interests on recent clay studies.
- The following committee was elected during this meeting:

President:	Alain Decarreau, Poitiers
Vice - President:	Jacques Yvon, Nancy
Secretary and Treasurer:	Sabine Petit, Poitiers
Address:	Université de Poitiers
	URA 721 CNRS
	"Argiles, Sols & Altérations"
	40, avenue du Recteur Pineau
	86022 Poitiers Cedex, Fax: 49 45 40 17

- Euroclay'95 was the second occasion of the year to gather for clay scientists. The French Clay Group helped financially 6 students to participate.

Future meetings

- The spring meeting will be held jointly with the Annual Meeting of the Earth Sciences on 10-12 April 1996 in Orléans (*RST96 "Dynamique et Economie de la Terre"*). The Group is associated for the following sessions:
  - Paleoenvironments and paleoclimates;
  - Soils and superficial formations, erosion and morphogenesis;
  - Mineral characterization, industrial minerals and geomaterials.
- A meeting in honor of Victor Drits will be held on 11- 12 March 1997.

Publication

- The results of discussions which took place during the "Journées spécialisées Argiles" organised on 27-30 September 1994 in Poitiers, are presented in a special issue of *Bulletin des Centres de Recherches Exploration - Production d' Elf Aquitaine* entitled "Structure and transformation of clays in petroleum and geothermal fields" (in French with extended abstracts in English).
  This special issue is available from the French Clay Group Secretary and the price is 250FF (postage included).

S. Petit

Gruppo Italiano AIPEA

About 10 Italian clay scientists participated in the EUROCLAY-95 held in Leuven/Belgium presenting several posters. F. Veniale was delivering the lecture "Correlation between fabric and geotechnical properties of argillaceous geomaterials", illustrating a new procedure for the estimation of the degree of orientation of clay particles, based on image processing of SEM pictures. The Jr. author, M. Setti (Dept. Earth Sciences, Univ. Pavia) is the first recipient of the Gruppo Italiano AIPEA award in honour of prof. L. Dell'Anna, a pioneer of clay research in Italy. This award is aimed to sponsor junior Italian clay researchers to participate in the EUROCLAY Meetings and International Clay Conferences of AIPEA.
A week-workshop with the participation of 25 junior researchers has been held in September at the ENEA (National Authority for Energy and Environment) Centre at Trisaia/MT, including lectures on the role of clay minerals in environmental problems, in coastal erosion and suspended particulate transport, and river basin management. A one-day excursion was devoted to the basin area of Sinni river, and its water reservoir dam.
About 60 participants attended the special session on "*Ancient ceramics and cultural heritage*" of the European Ceramic Congress held in October at Riccione/RN. The main topics presented and discussed were concerned with manufacturing, firing and glazing techniques of proto-historical, medieval

carved "terracottas" in Italy, their decay and restoration; furthermore, raw materials and manufacturing technique of the unique porcelain of Capodimonte-Naples.
A one-day workshop has been held in November at Pavia on "*Uses and applications of sepiolites*". The introductory lecture was delivered by A. Lopez-Galindo (Dept. Mineralogy and Petrology, University of Granada, Spain), who is leading a research programme for the characterization and exploitation of sepiolite and smectite deposits; he also presented a procedure for the quantification of sepiolite-palygorskite and other common components (smectite, illite, carbonates) based on both X-ray diffraction and chemical analysis data.

Fernando VENIALE

The Israel Society of Clay Research

The annual meeting of the Israel Society of Clay Research was held at the Open University in Tel-Aviv on October 25, 1995.
The meeting was opened with two invited lectures by guests from France:
- M. Boudeulle: Tracing the kaolinites through micro-Raman spectroscopy.
- G. Panczer: Micro-Raman spectroscopy of accessory anatase in kaolinites.

These were followed by papers dealing with various aspects of clay science:
- T. Polubesova, S. Nir, G. Rytwo and L. Margulies: Experimental and theoretical studies of adsorption of benzylalkylammonium on Na-montmorillonite.
- I. Sabach and M. Revhon: Sorption and desorption of trichlorophenol in soil (clay)-water systems.
- Y. Nathan: Coal fly ash from the Hadera M.D. power plant - characterization and potential contamination resulting from its use or disposal.
- A. Banin, I. Kan and F.X. Han: Novel approaches to surface acidity of clays and its relationship to surface chemistry.
- I. Kan and A. Banin: A model for the connection between surface acidity and major chemical species in clay suspensions.
- V. Chertkov and I. Ravina: Theoretical estimates of crack width and volume in a shrinking clay soil.
- A. Sandler and P. Wright: Illite/smectite geothermometry of the lower carboniferous in South-West Britain: Regional patterns and local variations.
- S. Shoval: Alteration to ferromagnesian-smectite, chlorite and kaolinite in various soils and dykes of the Makhtesh Ramon area.

The meeting was organized by the executive committee of the Society, Dr. S. Shoval, Chairman; Ms. N. Goldman, Mr. M. Gefet, and was sponsored by the Ministry of Environmental Quality and the Open University.

A. Banin

Clay Science Society of Japan

Annual Meeting (1995)
The 39th annual meeting of the Clay Science Society of Japan was held at Kochi University on September 28-30, 1995.

1. Awards:
- Prof. T. Watanabe (Joetsu University of Education) was awarded the Clay Science Society of Japan's Medal for contributions of application of XRD simulation to structure analysis of interstratified clay minerals.
- Dr. R. Miyawaki (Government Industrial Research Institute, Nagoya) was awarded a medal to encourage study on formation mechanism of kaolinite under hydrothermal conditions.
- Prof. J. Osaka (Tamagawa University) was awarded a medal for distinguished service to the Society.
- Applied Clay Science Institute, Hojun Kogyo Co. Ltd. was awarded a medal for contributions to technical innovation on manufacturing bentonite and related products.
- B. Okino, past president of the JCSS, T. Egawa, H. Takeshi, and H. Minato were selected as honorary members of the JCSS.

2. Special Lecture:
- Prof. N. Yamasaki (Kochi University) presented a special lecture entitled "Recent progress in science of hydrothermal experiments".

3. Symposium
A symposium entitled "Clay science and microscience" was convened by M. Shishime, A. Henmi, and S. Yamanaka. It included the following papers:
- "XPS, NMR, and SIMS of clay minerals" by M. Soma (National Institute for Environmental Studies, Tsukuba)
- "Soil colloid and phosphate ion" by M. Nanjo (Tohoku University)
- "Nano-scaled processing of clay crystals and their catalytic function" by K. Urabe (Nagoya University)
- "Molecular recognition on surface of clay: theoretical and experimental approaches" by H. Sato (Hitachi Co. Ltd.) with M. Taniguchi and A. Yamagishi (Hokkaido University)

4. Special session:
A special session entitled "*Future of bentonite*" was convened by K. Suzuki, H. Kubo, and M. Shishime and included 6 papers from various viewpoints of bentonite sciences.

5. General papers:
50 papers in oral session and 40 papers in poster session

6. Excursion:
Sediments of accretional prism and visiting old town in Aki city

B. Committee
The following executive members for the year 1996 were elected in the annual meeting:

- President: K. Aoyagi (JAPEX Geoscience Institute, INC.)
- Vice-President: M. Utada (University of Tokyo)
  T. Hayashi (Nishi-Tokyo University)
- General Secretary: K. Okada (University of Tokyo Institute of Technology)
- Treasurer: H. Yamada (National Institute for Research in In organic Materials).

The Nordic Society for Clay Research

The Nordic Society for Clay Research is a joint society of clay scientists and adjoining disciplines in the Nordic countries, viz Denmark, Finland, Iceland, Norway and Sweden. The aim is firstly to promote the interest for scientific work concerning clays and clay minerals. Secondly, to bring people from the Nordic countries together for lectures and discussions and to work for an international cooperation within the theme of "clay" research. This society comprises around 85 members from universities, geological surveys, research laboratories and industries. Two regular major meetings are held every year. These meetings are often held in universities or industries with clay activities and, when possible, excursions are arranged.
This year the spring meeting was organized during 18 - 19 May 1995 by Pekka Ihalainen and Olli Sarapää and held at the Geological Department, University of Helsinki, Finland. Seminars were followed by factory visits. Lectures were given within two major themes i) ordinary clay topics and ii) industrial applications of clays (kaolinite and bentonite).

Lectures were held under the following titles.

- Studies of the pore properties of Prehistoric ceramic samples (Pekka Ihalainen, Tampere University of Technology, Geolaboratory; Timo Jussila, Microlith Ltd, Espoo, Finland).
- Occurrences of sepiolite in soil environment and its role in accumulation and mobility of fluorine in a semi-arid region of Nagaur district, Rajasthan, Western India. (Prosun Bhattacharya, Division of Land and Water Resources, Royal Institute of Technology, Stockholm, Sweden).

- Quantitative determination of the mechanical properties of North Sea Tertiary mudrocks: Investigations by triaxial testing of side wall core - well 25/7-2. (Lars Wensaas, Per Aagaard, Department of Geology, University of Oslo; Toralv Berre, Norwegian Geotechnical Institute, Ullevål Hageby, Oslo; Elen Roaldset, Norwegian Institute of Technology, University of Trondheim, Trondheim, Norway).
- Experimental mineral diagenesis: a) Opal-A to Opal-CT to quartz transformation, (Elen Roaldset, He Wei and Line Jörgensen, Norwegian Institute of Technology, University of Trondheim, Trondheim, Norway), b) Smectite to illite transformation. (He Wei, Sigvard Grimstad and Elen Roaldset, Norwegian Institute of Technology, University of Trondheim, Trondheim, Norway)
- Some types of regional problematic soils in China - Geotechnical properties and problems. (Wang Sijing, Institute of Geology, Academia Sinica, Beijing, China).

During the afternoon there was a combined meeting of The Nordic Society of Clay Research and The Finnish Society of Geotechnics with four presentations:

- Virtasalmi kaolin as a raw material for light coloured facing bricks. (Martti Romu, Ceratean Oy, Espoo, Finland. New address Optiroc Oy AB, Helsinki, Finland).
- Water-compacted sodium-bentonite interaction in simulated nuclear fuel disposal conditions: The role of accessory minerals. (Avner Melamed and P. Pitkänen, VTT/YKI, Technical Research Centre of Finland, Espoo, Finland).
- Groundwater protection at road areas using sand bentonite, case study. (Pia Rämö, Lohja Rudus Oy, Environmental Technology, Helsinki. Finland).
- Stabilization of clays using various binders. (Heikki Kukko, VTT, Technical Research Centre of Finland, Espoo. Finland).

On the second day, visits were paid to the "IDO Kylpyhuoneet" (IDO Bathrooms) ceramic factory at Tammisaari (Ekenäs) and to the brick factory "Keramia Oy" at Kemio (Kemiö Mjösund). Mixtures and handling of different clays for manufacturing purposes of sanitary porcelain (IDO) and brickstone together with facing bricks (Keramia) were demonstrated. Also the robotized production of toilet stools was demonstrated.

Abstracts could be received on request to the editor of Message no 10 (Nov. 1995). Nordic Society for Clay Research, Ann Marie Brusewitz, Lappkärrsvägen 45 A, S-104 05 Stockholm. Included in this issue are also reports from one-day seminars on Petroleum Geology and Claystone Problems, 1990, -91, -92 and -93.

Announcement of future activities

In connection with the 1996 spring meeting, "The Rosenqvist Symposium" was announced under the topic of "*Clay Minerals in the Modern Society*", Oslo, May 19-21 1996. This symposium is planned in memory of Ivan Rosenqvist, who should have become 80 years of age on the 17th of May 1996. This symposium will be held as a Nordic conference with 4-6 invited key-note speakers. All presentations and discussions will be in English.

The symposium will be open for all scientific contributions related to clays and clay minerals. Main themes will be the following:

- Clays in the petroleum industry
- Clay minerals in the soil environments
- Reactivity of clays
- Clay mineral diagenesis and hydrothermalism
- Engineering aspects / soil mechanics -
- Industrial applications of clays

The symposium will be held at the Department of Geology, University of Oslo, on Monday and Tuesday, 20-21 May and a pre-symposium excursion on Sunday, 19th May 1996.

The traditional General Society meeting was held on the 15th of December, at The Geological Survey of Sweden, Uppsala, Sweden.

After election of the council for the oncoming year, this autumn meeting continued with the following lectures:

- Electrokinetic cleaning of contaminated soil. (Torgeir Rödsand, Norwegian Geotechnical Institute, Oslo, Norway).
- Clay and cement stabilized ashes used as cover material for mine dumps. Case study from Bersbo (Tom Lundgren, Swedish Geotechnical Institute, Linköping, Sweden).
- Sub-Cambrian clays in North Estonia. Sedimentology, mineralogy and diagenesis. (Per Jörgensen, Department of Soil and Waters, Agricultural University of Norway, Ås, Norway).
- Properties of goethite and jarosite precipitated from acidic groundwater in Dalarna, Sweden; an X-ray diffraction and Mössbauer spectroscopy study. (Roger B. Herbert Jr., Institute of Earth Sciences, Quaternary Geology II, University of Uppsala, Uppsala, Sweden).
- Endellite as fissure filling at Iittala, Finland. (Kristian Lindqvist, Geological Survey of Finland, Espoo, Finland).
- Experimental weathering of mica at room temperature - dissolution and alteration trends. (Peter Schweda, Department of Geology, University of Stockholm, Sweden).
- The influence of clay mineralogy on the thermal conductivity of sedimentary rocks. (Kirsti Midttromme, Norwegian Institute of Technology, Trondheim, Norway).
- K-balance in buried sandstone / mudstone sequences. (Jens Jahren, Per Aagaard and Mohammad Amir Iqbal, Department of Geology, University of Oslo, Oslo, Norway)

This autumn meeting ended with a demonstration of the office and laboratory facilities at the Geological Survey of Sweden.

The council of The Nordic Society for Clay Research.

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Recent dissertations in Sweden

Geological influences upon soil and groundwater acidification in southwestern Sweden. Lars-Ove Lång, Department of Geology, Earth Sciences Centre, Göteborg University, S 413 81 Göteborg Sweden

Abstract

The acidification of soils and waters is widespread in southwestern Sweden. This thesis documents and interprets geological conditions that are essential for practical assessments of environmental acidification. Emphasis is given to 1) classification and mapping of the acidification sensitivity in groundwater and 2) grain-size and mineralogical analyses from forest soil profiles with respect to base-cation release from primary minerals to the soil water.

Groundwater pH and alkalinity in aquifers (< 100 m depth) can be related to the grain-size of the surficial glacial deposits, mainly reflecting the residence time of water within the unsaturated and saturated zones. The most acidic groundwaters occur in thin, coarse-grained deposits in areas with high precipitation and high acid deposition rates. A distribution model for alkalinity is developed to illustrate the degree of alkalinity production in the most common sediment environments. The results have been used for mapping the acid sensitivity of groundwaters.

The release of base cations from primary minerals is decisive for the nutrient availability within soils, and these reactions also control alkalinity production. Grain-size, mineralogical and geochemical data from 26 forest soil profiles are used for determining primary mineral stabilities, clay mineral transformations, and the relationships between mineralogy and grain-size. Heavy minerals are primarily documented within the coarse-silt (45-63 microns) and sand fractions. The sites have been selected to represent the major mineralogical variations that can be expected to occur in carbonate-free, coarse-grained soils within southwestern Sweden.
Heavy minerals are concentrated in the coarse-silt and fine-sand fractions in water-sorted sediments. The tendency for different minerals to be size sorted within specific fractions is illustrated by the epidote abundance in the coarse-silt fraction. The regional bedrock mineralogy is reflected in the high sediment distribution of hornblende and epidote minerals, the most common heavy minerals. An order of increasing stability of apatite, titanite, hornblende, garnet, epidote and zircon is derived from till soils. Apatite is readily weathered in silt and sand fractions, while mica (biotite, illite) and hornblende are only significantly depleted in the clay fraction of the E horizons. These observations of mineral weathering are consistent with the long-term loss and the present deficiency of phosphorus, potassium and magnesium in the upper soil horizons. Clay-sized vermiculite is interlayered with hydroxyaluminium precipitates at depths, which are important in regulating the aluminium transport in the soil profiles.
Hornblende grains are more etched at sites with comparably lower hornblende contents. This type of variability of weathering intensity is important to consider in weathering rate calculations. The data have been separately used for estimating weathering rates by two methods, the long-term weathering method and the PROFILE model.

The geochemistry of groundwater and soils contaminated by acid mine leachate: A field study from Rudolfsgruvan, Dalarna, Sweden. Roger B. Herbert Jr, Institute of Earth Sciences, Quaternary Geology II, University of Uppsala, Sweden. Acta Univ. Ups., *Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology* 156. 33 pp. Uppsala ISBN 91-554-3615-3.

Abstract
This thesis presents geochemical and mineralogical studies of soils and groundwater at an abandoned Ni mine, Rudolfsgruvan, in the Province of Dalarna, central Sweden. At the field site, the oxidation of sulphide minerals and percolation of water through a rock dump has lead to the contamination of the underlying groundwater and adjacent hillslope with acidity, sulphate, Fe and other heavy metals. The chemical evolution of the leachate plume in the groundwater is dominated by Fe^{2+} oxidation, Fe^{3+} hydrolysis and precipitation, aluminosilicate dissolution, and physical dilution. During snowmelt, sulphide oxidation products present in the deposit are flushed into the underlying groundwater by the percolating water. Ion activity product calculations for Fe oxyhydroxides during this period suggest that relatively insoluble, well-crystallized Fe oxyhydroxides are continuously saturated to supersaturated in the groundwater closest to the rock dump and may be precipitating.
The X-ray diffraction and ^{57}Fe Mössbauer analysis of soil samples collected from the water table, down-gradient of the rock dump, indicate that goethite (alpha-FeOOH), lepidocrocite (gamma-FeOOH), and jarosite ($KFe_3[SO_4]_2[OH]_6$) are precipitating from the groundwater. The chemical extraction and electron microprobe analysis of the Fe oxyhydroxide precipitates demonstrate that Al is retained in goethite at levels up to 5.5 mole %. The analysis of these precipitates by Mössbauer spectroscopy suggests that the substitution of Al^{3+} for Fe^{3+} in goethite plus the low crystallinity of the precipitates contribute to a partial or complete collapse of the magnetic hyperfine field at room temperature. For the jarosite collected from the water table, cell dimension estimates and Mössbauer parameters suggest that the precipitates are K-rich members in a K-Na-H_3O solid solution.
The discharge of mine drainage waters onto the hillslope has led to the contamination of the podzol soils with Cu, Ni, Pb and Zn. The data suggest that most of the heavy metals in the surface drainage, with the exception of Fe, are retained in the upper regions of the hillslope near the rock dump. Only small accumulations of Fe, Cu, and Ni are measured further down the hillslope.

Per Arne Melkerud

Spanish Clay Society

During 1995 the activity has been focussed on the annual meeting of the Spanish clay society held in the University of Almeria on October 26 and 27, 1995. The guest lecture was presented by Dr. E. Ruiz-Hitzky of the Institute of Material Sciences in Madrid. Other lectures on Clay Research were presented by diverse Spanish groups.
The topics covered were:

- Littoral dynamic and sedimentary balance by Dr. F. Lopez-Aguayo of Càdiz University.
- Genesis of magnesium clays in continental deposits by M. Pozo Rodriguez and S. Leguey of Madrid University.
- Diagenesis in phyllosilicates by M. Rodas of Madrid University.
- Clay research in Institutes of Spanish Council for Scientific Research (CSIC) at Sevilla: lecture given by J.L.Perez-Rodriguez of the Institute of Material Sciences in Sevilla.

On 27th October a field trip to visit Almeria bentonites deposits (Minas de Godor) was carried out.

At the annual meeting, the following persons were elected to serve on the committee for 1996.

Chairman:	M. Ortega-Huertos
Past-Chairman:	F . Lopez-Aguayo
Vice-Chairman:	M. Rodas-Gonzàlez
Secretary:	A. Lopez-Galindo
Treasurer:	I. Palomo - Delgado

Committee Members: S.M. Gonzàlez-Lopez, M. Pozo-Rodriguez, I. Gonzalez-Diez, A. Alvarez-Berenguer, B. Casal-Pige, E. Garcia-Romero, F. Huertas-Garcia, C. Maqueda-Porras

During the meeting, Dr. Serratosa, past-President of AIPEA, gave a diploma to representatives of Tolsa S.A. in recognition for their donation of two AIPEA medals. These were given to Dr. S.W.Bailey and Dr. R.C.Reynolds at the closing ceremony of the International Clay Conference of Adelaide, in recognition of their scientific contribution to clay research.

During the '95 Euroclay Meeting held in Leuven, Belgium Dr. E. Galan, member of the Spanish Clay Society was elected President of the European Clay Group Association (EGA). During the Annual Meeting of our Society Dr. J.L. Perez-Rodriguez was nominated as representative of the Spanish Clay Society on the Editorial Board of Clay Minerals.

J.L. Perez-Rodriguez

Russia

The XIIIth Meeting on X-Ray Studies of Raw Mineral Materials was held at the State Technological Academy of Building Materials in Belgorod, on the 17-20th October 1995. It was called "International" because some representatives of the former Soviet Union and one from Germany were present. It was devoted to the memory of the late professor V.A Frank-Kamenetzky and the programme paid much attention to clay minerals problems among which the following may be indicated.

1. Crystal chemistry of phyllosilicate transformations.
2. Contribution of electron diffraction into the structural and lattice crystallography.
3. The use of X-ray texture patterns and scanning along definite trajectories in the reciprocal space for revealing selected detailed structural information. It was especially impressive in cases of poorly crystallized substances (e.g. soil clays).
4. New data about clay minerals in soils related to different formation and transformation conditions.
5. Information on the structural state of clays in deep and superdeep deposits.

6. Thermal deformations of phyllosilicate structures and lattices.
7. Crystal-chemical factors for improvement of the quality of technological products (ceramsites, porcelain insulators, mica-paper etc.) .

Liaison Officer	Prof. B.B. Zvyagin
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	Staromonethy, 35
	109017 Moscow, Russia
Fax	007-095-230 2179
E-mail	zvyagin @igem.msk.su

B. Zvyagin

The Netherlands

At the October 13 meeting Dr. S.J. van der Gaast was elected president and Dr.J.T.Kloprogge secretary. Three papers were presented at Euroclay '95:

- R.A. Kühnel: Clay Minerals in Basaltic Rocks
- S.J. van der Gaast: Thermal Transformation of Kaolinite and Metakaolinite
- J.T. Kloprogge: Synthetic Clay Minerals for Catalysis

R.A. Kühnel

Polish Clay Group

Fourteen Polish clay scientists authored and co-authored papers at Euroclay '95. Lectures on clay were also given at the meeting of the Polish Mineralogical Society.

A. Langier-Kuzniarowa

Korea

The joint meeting of the Clay Studies Group of Korea and the Mineralogical Society of Korea was held on May 19, 1995 at the National Institute of Agricultural Science and Technology in Suweon, Korea. The papers delivered at the meeting were:

- Wilson M.J.: Weathering of rocks by lichen and biomineralization.
- Lee C.-H, Lee S.-R, Lee S.-W. and Hin J.-H: Occurrence and mineralogy of authigenic glauconite on the continental shelf of the SE Yellow Sea.
- Song Y.G. and Moon H.S.: Regular interstratification of different layer charges in vermiculitization of phlogopite and biotite.
- Jeong P.G., Jang Y.S. and Shin J.S.: Mineral distribution in soils from

Korea.
- Jeong C.H. and Kim S.J.: Influence of ionic strength and pH on the Cs^{137} and Sr^{90} adsorption of kaolinite and bentonite.
- Ahn, J.H.: Comparison of stacking disorder of mica minerals and the modulated 2:1 layer silicate minerals.
- Kim G.Y. and Kim S.J.: Chemistry of chlorites in talc ores from Yesan-Gongju-Cheongyang area.
- Kim W.S.: Gemmological study of precious serpentine
- Jang, Y.S., Jeong P.G. and Shin J.S.: Synthesis of heavy metal absorbent using natural zeolites.
- Lee S.-R. : Soil washing by sequential extraction
- Lee Y.B. and Lee J.H.: Identification of interlayering in phyllosilicates using EPMA analyses.

Soo Jin KIM

Hungary

Papers on clay mineralogy were presented in the sessions and meetings of the Hungarian Geological Society and the Hungarian Soil Science Society, held in Budapest. The following lectures were held:

February 13
Akande, S.O. (Ilorin, Nigeria), Viczián, I: Diagenesis of clay minerals around hydrothermal mineralization in the Benue Trough, Nigeria. (The same topics were discussed on October 25, in Veszprém, in the Commission on Organic Geochemistry of the Academy of Sciences, emphasizing paleothermometry and hydrocarbon potentials).

March 10
Viczian, I.: Mineralogy of a Paleogene - Lower Miocene sedimentary sequence in the northern part of the Bükk Mts (NE Hungary). The lecture was held in Miskole.

April 21
Sassi F.P. (Padova, Italy): An overview on the petrogenetic significance of Na-K white micas: recent advances for metamorphic rocks.

May 11
Varsàanyi I.: Modelling of rock-water interaction in the Pleistocene sediments of the Danube in the southern Great Plain (The lecture was held in Kecskemét).

November 15
10th anniversary meeting of the Soil Mineralogy Section. Papers were presented on the soil clay mineralogy map of Hungary (P. Stefanovits and L.Dombovan), boundary surface models in clay/water systems (N.M. Nagy and J. Konya), the interaction of soil and tensides (A. Patzko) and micromorphology of soils (G. Szendrai)

Between 15-24th February a short course was held in the Department of Applied and Evironmental Geology of Eötvös University, Budapest on "Practical Clay Geology" by Prof. J.Thorez (Liège, Belgium). Some 15 persons attended the very successful course.
On April 20, a memorial session was held in Veszprém in honour of the late professor of mineralogy of the Veszprém University, Istvan Vassànyi. Papers on analytical methods (M. Földvàri, P. Kovacs-Pàlffy), on the study of archaeologic materials from Peru (T. Wiszburg, B. Bajnoczi), Tertiary sediments of the Zagyva Graben (I. Viczián) and pillared clays (A. Szabo and M. Toth) were presented.
The EUROCLAY '95 meeting on 20 to 24 August in Leuven (Belgium) was attended by 6 Hungarian participants. Papers on geology and colloid chemistry of clays were presented.

Istvan Viczian

10. MEETINGS

1. The Rosenqvist Symposium on Clay Minerals in the Modern Society

19 - 21 May, 1996, Oslo. NORWAY

Introduction
Ten years ago, the Nordic Clay Group (The Nordic Society for Clay Research) organized the Uppsala symposium "Clay Minerals - Modern Society", and we would like to focus the importance of clays in modern society. On May 17, 1996 Ivan Rosenqvist would have been 80 years old. The Nordic Clay Group will dedicate this symposium to his memory and keep it in its spirit.
The symposium will be held as a Nordic conference with 4-6 invited keynote speakers.
All presentations and discussions will be in English.
The symposium will be open for all scientific contributions related to clays and clay minerals, but we will try to focus on the following themes:
- Clays in the petroleum industy
- Clay minerals in the soil environments
- Reactivity of clays
- Clay mineral diagenesis and hydrothermalism

- Engineering aspects/soil mechanics
- Industrial applications of clays

The symposium will be held at the Department of Geology, University of Oslo on Monday and Tuesday, May 20-21, with an excursion on Sunday 19. There will also be a chance to celebrate the 17th of May, the Norwegian day of independence, before the seminar, if you decide to arrive a few days earlier.

Scientific papers

The scientific papers will be given either as oral presentations or posters. The program committee will decide, based on the number of papers and the topics covered, what will be the most suitable form of presentation

There will be non-parallel oral sessions organized to follow the main themes of the symposium, and one plenary session devoted to short presentations of the posters and discussions.

Deadline for abstracts will be March 1, 1996. The abstract should preferably be given as a Word or Word Perfect document, and if possible mailed on a floppy disk or as an attached document by e-mail.

An abstract volume will be printed for the seminar, but we will also ask the participants to submit their papers for a special issue of "Clay Minerals", so the scientific contributions of the symposium can reach a wider audience. This special issue will contain the key-note lectures as well as full articles and extended abstracts (notes). The normal review standards and procedures of "Clay Minerals' will apply and this will ensure the quality of the papers and assist in the editing process. Please take this opportunity to publish your recent work on clays and clay minerals!

Field trip

A field trip is planned to the Romerike area, north of Oslo. We will visit the marine clays and glaciofluvial outwash deposits from the last Weichselian deglaciation, and see quick clay slides and discuss the hydrogeology of the area. We will also visit a clay pellet factory (Leca). Minimum number of participants: 20.

Accomodations

Participants will be accomodated either at Gyldenlöve Hotel or Pan Student Hotel. Both are located close to the University Campus, and can be reached by foot or by tram. Approximate price incl. breakfast: Gyldenlöve; 530 NKr and Pan 470 NKr, respectively. There will be a banquet on Monday evening.

Final registration will be March 1, 1996. We hope to see you in Oslo. Please feel free to contact us:

Per Aagaard: Phone +47 22 85 66 44
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E-mail: per.aagaard@geologi uio.no

Jens Jahren: Phone +47 22 85 66 11,
Telefax +47 22 85 42 I5
E-mail: jens.jahren@geologi.uio.no

Postal Address: Department of Geology
University of 0slo,
P.O.Box 1047 Blindern
N-0316 Oslo

2. THE CLAY MINERALS SOCIETY

33rd Annual Meeting

June 15-20, 1996, Gatlinburg, Tennessee, USA

Local Committee

General Chair: S. Y. Lee, (423) 574-6316
e-mail: syl@ornl.gov

Program Chairs: Claudia Mora, (423) 974-6010
e-mail: mora@yoda.gg.utk.edu
Paul Bertsch, (803) 725-2472
e-mail: bertsch@srel.edu

Field Trip: Dave Lietzke, John Foss, and Michael Clark

Fund Raising: Mark Elless, (423) 576-8192

Hosted with

Environmental Sciences Divisions, Oak Ridge National Laboratory
Departments of Plant and Soil - Sciences and Geological Sciences,
The University of Tennessee
Oak Ridge Operations, U. S. Department of Energy

Technical program

Oral and poster sessions

Monday, June 17 through Thursday, June 20

General Sessions:

Mineral Weathering, Clay Diagenesis and Soil Pedogenesis, Clay Structure and Analysis Technique, Clay Minerals Application, etc

Symposia

- Clay Sciences for Environmental Remediation and Waste Management
  Conveners:Chet Francis/Mark Elless, (423) 576-8192, Fax (423) 574-7420
- Isotope Geochemistry and Environmental Research
  Convener: Claudia Mora, (423) 974-6010, Fax (423) 974-2368
- Colloid Charasteristics and Transport
  Conveners: Paul Bertsch, (803) 725-2472, Fax (803) 725-3309,

John McCarthy, (423) 576-6606, Fax (423) 576-8643
- Application of Clays for Nanocomposite (Clay-Polymers) Material Development
  Conveners: Gary Beall and Simeon Tsipursky, (708) 392-4600, Fax (708) 506-6199
- Clay-Biology-Health Sciences
  Conveners: George Guthrie, (505) 665-6340, Fax (505) 665-3285; John Naim, (716) 338-4662; Fax (716) 338-3442

Field trip
Soils and Geomorphology of Valley and Ridge Province
(Wednesday, June 19)
Leaders: Dave Lietzke, (423) 828-4617; Fax (423) 828-5336
John Foss, (423) 974-8801; Fax (423) 974-7997
Michael Clark, (423) 974-6006; Fax (423) 974-2368

Pre-Meeting Workshop, Saturday, June 15
The Isotope Geology of Clay Minerals:
From Isotope Crystal Chemistry to Petrogenesis

Conveners: F. J. Longstaffe and T. K. Kyser

Introduction and Announcement
The Stable Isotope Geochemistry of Clay Minerals, General Principles (F. J. Longstaffe)
Unstable Isotope Geochemistry of Clay Minerals, General Principles (T. K. Kyser)
Stable Isotope Fractionation in Clay-Water Systems and Intracrystalline Fractionation (Sam Savin)
Applications I: Integrated Stable and Unstable Isotope Studies of Clay Mineral Genesis (Norbert Clauer)
Applications II: Integrated Stable and Unstable Isotope Studies of Fluid Flow Using Clay Minerals
(Tentative - Peter Vrojlik, Dave Pevear)
Perspectives from the Lecturers: Problems and Future Developments in Isotope Studies of Clays

Other activities
Ice-Breaker Reception: Sunday, June 16
Talk to NSF Geoscience Program Directors: Monday, June 17 (lunch)
Student Reception: Monday, June 17
Annual Banquet: Tuesday evening, June 18
Possible Accompanying Persons Activities: Tour of Biltmore Estate, Wednesday, June 19

Hotel Headquarters

The Workshop and Technical meetings will be held at the Park Vista Resort Hotel, Airport Road, Gatlinburg, Tennessee (423-436-9211, 1-800-421-7275, Fax 423-436-5141). The room rate for singles and doubles is the discount government rate of $84.74 (tax inclusive) for all attendees.

Call for papers
Deadline for receipt: February 1, 1996
Members and non-members are welcome to submit papers on any subject related to clays or to a specific topic session. Posters as well as oral presentations may be submitted to any of the sessions. Poster Sessions will be scheduled for Monday and Tuesday afternoons with food and drinks to promote lively discussions.
Abstracts are due February 1, 1996.
If you don't select a topic on the information form, to be submitted with the abstract, your paper will be placed in the General Sessions. If you have a question about whether or not your paper is appropriate for a particular session, contact one of the conveners. The final program will be assembled after all abstracts have been received: it is possible that slight changes from the author's choice of session, or style of presentation (oral versus poster) may be made in order to fit time and space constraints. Notification of acceptance will be mailed in early March. The final program will be sent to pre-registrants with registration materials.

Schedule
The deadline for receipt of abstracts, in the format described below is February 1, 1996. You need to submit an original and three (3) copies. The original of each accepted abstract will be published in the abstract volume to be distributed at the meeting. **Please note that abstracts sent by FAX equipment will be neither acknowledged as submissions nor accepted for publication.**

Format
Type the abstract on white, good quality 8.5x11" bond paper. Abstracts must be no longer than one page (including any graphics, tables, and references). Photos, figures, tables, etc., must be drawn, typed, or glued directly on the original abstract page. References should be cited by number [e.g., (1)] and listed sequentially at the end of the abstract. You do not need to cite the titles of referenced papers.
Size: Width, .5" and Length, .5"
Font: courier, Times Roman, or similar fonts are acceptable. Please use 12 point type and single space for text and double space between paragraphs. The title and authors' names and addresses should be in bold type.
Justification: Please left justify the title, authors, and text of the abstract.
Speaker: Please note the presenter or speaker with an underline.

Mailing
Do not fold your abstract when mailing it. Be sure to include a completed Information Form. Please be sure to specify the name of the author to whom correspondence should be sent. **Mail your original abstract plus 3 copies to**
Pat Honeycutt
Lockheed Martin Energy Systems, Inc.
Bear Creek Road
Building 9201-3, MS/8064
Oak Ridge, TN 37831 USA
Questions
Inquiries may be addressed to Technical Symposium Chair (see Technical Program).

Important dates

January 1, 1996	Response form due for next mailing
February 1, 1996	Deadline for abstracts
April 15, 1996	Deadline for economy registration fees
April 15, 1996	Last day for 100% refund
May 1, 1996	Last day for 50% refund
May 14, 1996	Deadline for hotel registration
May 15, 1996	Last day for pre-registration

3. 30TH INTERNATIONAL GEOLOGICAL CONGRESS

August 4-14, 1996, Beijing, China,

Addresses	30th I.G.C. P.O. Box 823 Beijing 100037 P.R. China
Telephone	86-10-8327772 86-10-8323188
Fax	86-10-8328928
E-mail	zhaox@hepx.ihep.ac.cn.

4. 14th CONFERENCE ON CLAY MINERALOGY AND PETROLOGY

September 2-6, 1996, Banska Stiavnica, Slovakia

Conference organizers:
Czech und Slovak National Clay Group
Faculty of Sciences
Comenius University

Institute of Inorganic Chemistry
Slovak Academy of Sciences
City of Banskà Stiavnica
Novoker Lucenec

Scope
Geological, mineralogical and chemical aspects of clays and zeolites
Theory, research, applications in industry and environment
Place and date
Banska Stiavnica, September 2-6, 1996
Slovakia
Language
English will be the working language throughout the conference with no translation services provided
Timetable
1. Return preliminary registration form before November 15, 1995
2. Second Circular, December 15, 1995
3. Submission of abstracts before March 15, 1996.

Correspondence
All correspondence should be addressed to
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11. BOOKS

- *Feldspars and their Reactions*
  Proceedings NATO Advanced Study Institute, Edingburgh, UK, June 29, July 10, 1993.
  Editor: I. Parsons
  NATO ASI, Series C, 1994, 421, Nr 680.

- Genesis and Properties of Collapsible Soils
  Editors: E. Derbyshire, T. Dijkstra and I.J. Smalley
  NATO ASI Series C, volume 468.

- The geological Disposal of high level radioactive Wastes
  Editor: Prof. D.G. Braskins
  Theophrastus Publications, 1987.

- Journal of African Earth Sciences

12. THE W.F. BRADLEY AWARD APPLICATION FORM

1. I have read the regulations governing the above award and in conformity therewith I herewith submit a paper entitled:

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together with, if the paper is not in English, a summary of over 1000 words in English.

2. My date of birth is (day-month-year)
3. My submission is supported by:

   (a) NAME _____

   Signature _____

   (b) NAME _____

   Signature _____

   who are both members of AIPEA.

4. I agree to abide by the rules governing the Award and accept that the examiners' decision is final.

Date: _____ Signature: _____

N.B.
1) If the candidate is not the sole author of the paper, a statement from the coauthor(s) is required specifying the candidate's contribution of the paper.
2) No letter of recommendation of any kind will be entertained

13. MEMBERSHIP

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2. Pay membership fees for four-year periods
3. Make check or money order payable to AIPEA and mail to:

Dr. P.M. Huang
The Saskatchewan Institute of Pedology
John Mitchell Building
University of Saskatchewan
Saskatoon, Saskatchewan,
CANADA S7N OWO

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The Saskatchewan Institute of Pedology
John Mitchell Building
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Saskatoon, Saskatchewan,
CANADA S7N OWO