

# A I P E A

## NEWSLETTER

MARCH 1971

NO. 5

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

## 1972 INTERNATIONAL CLAY CONFERENCE

Madrid, Spain June 25-30, 1972

The 1972 International Clay Conference will be held in Madrid, Spain June 25-30, 1972. The Conference has been organized by the Spanish Clay Society (S.E.A.) under the auspices of the Association Internationale Pour l'Etude des Argiles (A.I.P.E.A.), in cooperation with the University of Madrid, the National Research Council of Spain (C.S.I.C.) and the Spanish Institute of Geology and Mining (I.G.M.E.). Technical sessions will be held June 25-30, 1972; field trips will be arranged for approximately five days, beginning on July 1, 1972.

Membership in the Conference will be open to all persons interested in clay science, soil science, ceramics, and clay technology from all countries. The registration fee for the Conference will be US \$50 for members and \$20 for accompanying members. Members will receive both volumes of the Proceedings free of charge.

The following sections are planned:

1. Crystal chemistry of clay minerals (structures included)
2. Clay minerals genesis and synthesis
3. Colloidal properties of clays
4. Surface chemistry of clays (including catalytic properties)
5. Volume absorption phenomena (organic compounds included)
6. Technical properties and applications of clays and clay minerals
7. General papers

Contributions in the areas of "Quantitative determination of clay minerals", "Wall rock alteration", and "Clay minerals in diagenesis" will be welcomed. The Organizing Committee also plans to arrange a Kaolin Symposium during the Conference as part of the "Kaolin correlation program".

Questions about clay minerals nomenclature should be sent to Dr. G. Pedro, C.N.R.A., Laboratoire des Soils, Route de Saint-Cyr, 78, Versailles, France. Opportunities will be provided for recommendations of the nomenclature committee to be communicated to the Conference.

Special programs for ladies accompanying members of the Conference will be arranged.

The following regulations concerning presentation of papers have been established by the Organizing Committee:

1. Manuscripts will only be accepted from registered members who have paid the registration fee.
2. The Reviewing Committee of the Conference reserves the right to reject manuscripts or suggest minor changes.
3. It is planned to publish the papers in advance of the Conference.
4. Participants will make only a short presentation of their papers, with more emphasis being given to discussions.
5. Further information on the submission of manuscripts will be given in the Second Circular.

In the Proceedings English, French, German and Russian languages will be accepted, but all abstracts must be written in English.

In conjunction with the Clay Conference the following field trips and visits to institutes and companies will be arranged:

1. Localities of clay minerals (kaolinite, halloysite, sepiolite, attapulgite and montmorillonite).
2. Companies and institutes active in clay production and clay research related to ceramic, chemical, petroleum industries, etc.

Detailed program of field trips will be announced in the Second Circular.

Comfortable accommodations for attending members and their families will be available in hotels in Madrid. Prices for hotel rooms will be included in the Second Circular.

If you have not returned the preliminary registration form, you are urged to write immediately to the Organizing Committee indicating your desire to participate in the Conference. This will insure your being included on the mailing list for all future circulars. Correspondence should be addressed to:

1972 International Clay Conference  
The Organizing Committee  
c/o Departamento de Cristalografía y Mineralogía  
Facultad de Ciencias. Sección de Geología  
Ciudad Universitaria  
Madrid 3, Spain

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#### MEMORIAL OF GEORGE F. WALKER

The death of George F. Walker on February 17, 1970, during a cardiac operation removes from our midst an outstanding clay mineralogist; born October 24, 1916, he appeared to have many years ahead of him. He will be greatly missed by many friends and especially by the council and members of A.I.P.E.A. of which he was Vice-President.

He was a graduate of the University of Aberdeen, Scotland, with the degrees of B.Sc. (1939); Ph.D. (1948); D. Sc. (1959). He was a Fellow of the Mineralogical Society of America, and of the Royal Australian Chemical Institute, a member of the Mineralogical Society (London) and of The Clay Minerals Society, and Foundation President of the Australian Clay Minerals Society. He held research positions with the British Ceramic Research Association (1941-45), the Macaulay Institute for Soil Research (1945-51), and with the C.S.I.R.O. in Melbourne (1951-70) where he became Chief Research Scientist in the Division of Applied Mineralogy.

His numerous publications have been concerned principally with the structure, identification, and properties of vermiculite, and particularly of the organic complexes of this mineral. He contributed the well-known chapters on vermiculite in the two editions of "X-ray Identification and Crystal Structures of Clay Minerals" and (with W. F. Cole) in "The Differential Thermal Investigation of Clays". Among his later papers were several indicating a broadening of his interests, including studies of organic complexes of nickel cyanide and the application of NMR to the study of interlayer water in layer silicates.

The passing of George Walker leaves a gap in the ranks of clay mineralogists which will not easily be filled and his many friends everywhere will mourn his early departure.

--G. W. Brindley

#### RECENT DEATHS

William A. Mitchell, Macaulay Institute for Soil Research, Aberdeen, Scotland, died May 15, 1970. Born at Inverurie, Aberdeenshire on Sept. 6, 1918 he was educated at Peterhead Academy and joined the staff of the Macaulay Institute for Soil Research, Aberdeen, as a scientific assistant in 1936. After service in the Royal Air Force in World War II he matriculated at the University of Aberdeen and received the B.Sc. degree with first class honors in geology in 1947. As a member of the staff of the Soil Survey of England and Wales he gained considerable experience of soils in the field and of x-ray diffraction techniques for clay mineral studies. He was responsible for all the x-ray diffraction and optical mineralogical investigations at the Macaulay Institute from 1951 until his death. Through application of his extensive knowledge of x-ray crystallography he developed several techniques using the x-ray diffraction powder camera which made possible more accurate and rapid determinations of the mineralogy of soil clays. Because of his geological and mineralogical background he maintained a particular interest in the relationship between the mineralogy of the parent rock and the clay mineralogy of soils derived therefrom. His publications were of a high standard and his wider understanding of his subject was invaluable in his capacity as Editor of Clay Minerals, a post he held from 1966 to 1969.

-- R. C. Mackenzie  
(from Clay Minerals (1970) 8, i-ii)

Margaret D. Foster, first woman chemist employed by the U. S. Geological Survey, died Nov. 5, 1970, in Washington, D. C. at the age of 75. She was noted for her work in clay minerals, particularly chlorites, micas, and zeolites. Her publications on the chemical composition and structures of the 2:1 minerals were classic examples of her meticulous and highly competent approach to clay research.

#### ANNOUNCEMENTS OF FUTURE MEETINGS

STRUCTURE AND SURFACE PROPERTIES OF CLAY MINERALS COLLOQUIUM, Louvain, Belgium, May 31-June 2, 1971.

This meeting is intended to be a joint meeting of the French, the British, the Spanish and the Belgian Clay Mineral Groups, but invitations will be sent to all European Clay Scientists. The final program will be made on the basis of the summaries received by the Dec. 31, 1970 deadline. The number of papers will be limited to 35. Further information regarding this meeting may be obtained by writing to: The Secretary of the Belgian Clay Group, 42 de Croylaan, 3030 Heverlee, Belgium.

20th ANNUAL CLAY MINERALS CONFERENCE, Rapid City, South Dakota, August 8-12, 1971.

This conference is sponsored by The Clay Minerals Society with joint participation by the Mineralogical Society of America. A field trip to Black Hills pegmatite localities, and a symposium on the phosphate minerals associated with them will occupy August 8 and 9. General Sessions for both Societies will be followed by an excursion through the Wyoming bentonite-producing areas on August 12. Notice of intent to present general contributions or volunteer supplements to the invited phosphate symposium shall be sent to the Program Chairman by May 25, 1971. Each intended author will be provided with detailed specifications for the preparation of his abstract, and with an abstract form on which to type his first copy. Direct photographic reproduction of the Program and Abstracts volume will make possible a deadline date of June 30, 1971 for receipt of completed Abstract forms. A Preliminary Program with tentative scheduling and a preregistration form and housing information will be distributed by June 15th to all who indicate an intention to attend and/or participate in the program. The complete Program and Abstracts will be distributed only to registrants at the meeting, but may be ordered separately at a cost of \$1.50.

Direct correspondence other than that related to Symposium invitations to: W. F. Bradley, Department of Chemical Engineering, The University of Texas at Austin, Austin, Texas 78712.

The invited Symposium is arranged by: D. H. Garske, Department of Geology, South Dakota School of Mines, Rapid City, South Dakota 57701

1st NATIONAL CONGRESS GRUPPO ITALIANO DELL A.I.P.E.A., Venice, Italy, May 16-19, 1971.

The first National Congress of the Italian Group of A.I.P.E.A. will meet to elect the Council for the period 1971-1975 as well as holding scientific sessions and making visits to ceramic research laboratories and industries. Dr. J. Chaussidon (CNRA, Versailles, France) will give an invited lecture on "Application of infrared spectrometry to the study of clay minerals".

THIRD INTERNATIONAL CONFERENCE ON THERMAL ANALYSIS, Davos, Switzerland, August 23-28, 1971.

The Third International Conference on Thermal Analysis (ICTA III) has been organized by the International Confederation for Thermal Analysis and will be held in Davos, Switzerland August 23-28, 1971. The following sections are planned: 1. Advances in instrumentation, 2. inorganic chemistry, 3. organic chemistry (including polymers), 4. ceramics, and 5. earth sciences. Abstracts should be submitted to the Program Chairman before May 1, 1971. The Program Chairman is Prof. H. R. Oswald, Institute for Inorganic Chemistry, University of Zurich, Rämistrasse 76, 8001 Zurich, Switzerland. The General Chairman of the Organizing Committee is Dr. Max Müller-Vonmoos, Institute for Crystallography and Petrography, Swiss Federal Institute of Technology, Sonneggstrasse 5, 8006 Zurich, Switzerland.

THERMAL RECOVERY OF OIL, The Pennsylvania State University, July 26-30, 1971.

A one-week course on "Thermal Recovery of Oil" will be offered by Dr. S. M. Farouq Ali, Pennsylvania State University, University Park, Pennsylvania July 26-30, 1971. The course will cover the practical aspects of steam injection and in-situ combustion as oil recovery methods, emphasizing the design criteria. Experiments will be included to illustrate some of the basic concepts involved. For details write to: Dr. S. M. Farouq Ali, 11 Mineral Industries Building, University Park, Pennsylvania 16802.

#### NEWS OF NATIONAL CLAY GROUPS

##### ARGENTINE SOCIETY OF CLAYS

The Argentine Society of Clays was founded Nov. 15, 1969 and the provisional council was as follows: President--Dr. T. G. Krenkel; Secretary--Dr. A. Iniguez Rodriguez; Treasurer--Dr. S. Cohen Arazi; Council Members--Dr. G. Mazza (Bahia Blanca), Dr. C. Cetrangelo (Buenos Aires), and Dr. P. Depetris (Santa Fé). The number of members of the Society is about 25.

Activity of the Society during 1970 included arrangements for a series of four lectures by Dr. Paul Rouxhet, Visiting Scientist from the University of Louvain, in La Plata August 18-21, 1970. Professor J. J. Fripiat, University of Louvain, presented lectures on dynamic concepts of catalysis and structural organization of alumino-silicates and amorphous alumina at the National University of La Plata, Sept. 14-15, 1970.

The second annual meeting of the Society was held Oct. 30-31, 1970 in La Plata. The agenda for this meeting included discussion of the by-laws of the Society, election of the president and council, discussion of the possibility of a Society publication, and papers reporting activities of the various research centers of the country.

--Dr. T. B. Krenkel  
Dr. A. Iniguez Rodriguez

##### AUSTRALIAN CLAY MINERALS SOCIETY

The Fifth Biennial Conference of the Australian Clay Minerals Society was held at Monash University, Melbourne, Victoria, on August 18, 19 and 20, 1970. The meeting was held in conjunction with the Fourth Conference of the Australian Ceramic Society and was attended by about 50 members from industry and research institutions throughout the Commonwealth. A notable visitor at the Conference was Prof. Dr. Udo Schwertmann of the Institut für Bodenkunde der Technischen Hochschule München, West Germany and present Secretary General of A.I.P.E.A.

Technical sessions of the Conference dealt with a wide variety of topics under the general headings of Physico-chemical Properties of Clays, Mixed-layer Clay Minerals, Occurrence of Clays, and Industrial Implications of Clays. Preprints of the 23 papers presented are yet available in limited quantities at a cost of \$5 Australian from the Secretary-Treasurer: Dr. J. H. Patterson, C.S.R. Research Laboratories, Box 39 P.O., Roseville, N.S.W., Australia 2069.

Two organized field trips to the Bendigo and Geelong regions of Victoria following the Conference gave participants an opportunity to inspect mines extracting refractory and paper-grade kaolins as well as pottery and cement clays. Industries utilizing some of these materials were also visited.

On the occasion of this Conference members were sadly aware of the absence of the Founder President of the Society, Dr. G. F. Walker, who passed away following a cardiac operation on Feb. 17, 1970. Prof. J. P. Quirk, President of the Society, drew attention to the many qualities in George Walker which won him the respect and affection of all his friends and colleagues and universal recognition as a leader in his profession. At the time of his decease Dr. Walker was Vice President and President-elect of A.I.P.E.A.

--J. D. Hamilton

##### CLAY MINERALS GROUP OF BRITAIN

The autumn meeting of the Clay Minerals Group on the general theme "Recent Advances in Clay Research" was held November 13, 1970. The spring meeting will be on the topic "The Structure of Clay Minerals" and will be held March 26, 1971, in Burlington House, London. Professor G. W. Brindley will be the guest speaker.

The British Clay Minerals Group will meet jointly with the Belgian, French and Spanish Clay Groups in Louvain, Belgium May 31-June 2, 1971 for a colloquium on "Structure and Surface Properties of Clay Minerals".

Several members of the Clay Minerals Group participated in a meeting of the Geochemistry Group of the Mineralogical Society on "Resonance Spectroscopic Methods in Mineralogy" at Oxford on Jan. 5, 1971.

##### ITALIAN GROUP OF A.I.P.E.A.

Under the leadership of Prof. Dr. Fernando Veniale, Istituto di Mineralogia e Petrografia, Università di Pavia, an Organizing Committee was formed on Oct. 5, 1970 to plan the First National Congress of the Italian Group of A.I.P.E.A. This Congress will be held in Venice, May 16-19, 1971 and the Council for the period 1971-1975 will be elected by the General Assembly. The Italian Group has about 40 members at the present time. Membership dues for the Italian Group of A.I.P.E.A. include the membership due for A.I.P.E.A. so that all members of the Italian Group are simultaneously members of A.I.P.E.A.

The activities of Italian researchers in the field of clay mineralogy during the period 1966-1969 may be grouped into the following categories: (a) identification of the typical minerals in clays; studies of their chemical, physical and structural features and mechanisms of genesis; (b) identification and quantitative determination of clay minerals in sedimentary formations; and (c) exploration and industrial exploitation of clay deposits.

Numerous clay minerals have been described and identified in different rock formations in Italy: illite and montmorillonite in Tretto (Vicenza) clays; expansible chlorite in Predosa clay; sepiolite in Voghera Apennines; volkhonskoite in Castiglione (Tuscany) serpentine formations; talc-saponite among the transformation products of ophiolitic rocks in Pavia-Piacenza Apennines; glauconite in the sandstones of Costalunga Valley (Belluno); clinoptilolite and Na-montmorillonite in the Zovencedo (Vicenza) sedimentary formation; halloysite and analcime in Roccamorfin pyroclastics.

Detailed thermal and x-ray diffraction studies of dehydration and rehydration of mixed-layer minerals with spacings of 24 Å (saponite-talc) and 25 Å (chlorite-saponite) have made it possible to distinguish the behavior of the individual constituents and thus provide new features for characterization of the individual minerals. Determinations on the type of stacking in a mixed-layer clay mineral from Kinnekule have been carried out. A method to distinguish between well-crystallized kaolinites and disordered kaolinites has been developed.

Research on the iron-containing montmorillonites of the Noto Valley (Sicily) including thermal studies on the vitreous component containing them, has permitted identification of a montmorillonite with a single layer of water molecules ("metamontmorillonite") which is stable between 450 and 560°C. It has been suggested that such montmorillonites are products of primary alteration formed during the consolidation of the vitreous component with which they are associated.

The transformation of Roccamorfin halloysite and of the Punta dell'Epitaffio (Bria) montmorillonite in an alkaline environment at a low temperature resulted in the formation of hydrosodalite and chabazite as well as zeolites not yet found in nature. Experiments carried out in an alkaline hydrothermal environment at temperatures of 200 to 300°C. produced analcime, phillipsite, kaliophilite, leucite and a mineral similar to hydronepheline.

Studies of the cation exchange capacity and distribution coefficient of quaternary clays of the Pisa plain have shown the clays to have a high capacity for absorption of Cs<sup>+</sup>; this property is of great importance for the decontamination and treatment of liquid radioactive effluents.

The composition of the interstitial water in equilibrium with clay and the relations between the water composition and the nature of the present clay minerals have been studied on 62 samples of Cortemaggiore clays (Po Valley), 19 samples of Gagliano (Sicily) Miocenic clays, 12 Triassic clays of Gela 32, 30 Triassic clays of El Borma I (Tunisia), and on 2 carboniferous clays of the North Sea. The results obtained confirm that clay is in equilibrium with interstitial water and the structural variations of minerals, in particular the swelling ones, are affected by the potassium content of the water. The montmorillonitic clay changes first into disordered mixed-layer

minerals, then into ordered mixed-layer minerals. For high potassium contents in the interstitial water, illite represents the stable mineral and sometimes it is possible to observe illitization of kaolinite.

The gas chromatographic performance of organic complexes obtained with different types of clay minerals is being studied.

Research on sedimentary problems include: mineralogical and petrographic research on the "Umbrian scale" outcropping in the Battaccione Valley near Gubbio which has established the predominance of montmorillonites and chlorite-vermiculite in the clay fractions; the study of the stratigraphic distribution of the individual minerals has provided data on the features of the feeding and sedimentary field of the "scale"; studies on clays of Piacenza Apennines extending from the upper Cretaceous to the Oligocene; stratigraphic, sedimentological and petrographic analyses of the mesozoic formations of the Lima Valley (Lucca), and on the limestones with flint of the above autochthonous series in the northeastern part of Mount Pisano or in the mountains beyond the Serchio (Pisa and Lucca); research on the pelitic rocks of the hard sandstone formation and of the marly-arenaceous formation of the Cosentino and Valdarno lake deposits; study on the correlations between the flysch of the Lombard-Venetian Pre-Alps and that of northern Apennines; research on the fluvial clay sediments from Brenta to Reno rivers; clay mineralogy of the marine sediments of the Po delta; studies on cretaceous limestones, on Apulia "red earths" (terra rossa) and on Apulia and Lucania plio-pleistocene sediments; research on the mineralogical composition of Sardinian clays of Pauli Arborei and Saint Peter Island.

Research of mainly an applied type has been carried out on the hydrated aluminum silicates of Prata Sannita and Albiano (Caserta). The essential component of these materials has been shown to be metahalloysite; the characteristics of the deposits have been determined and possible utilization of the material in the paper industry considered.

A bentonite deposit has been found at Uri (Alghero, Sardinia) and evaluation of its industrial potentiality has shown that this bentonite has physico-chemical and technical features corresponding to those of the best Italian and foreign bentonites.

Other research on problems related to clays include: dilatometric analyses made in the Richard Ginori Laboratories on clays of various origins, the study of electrochemical phenomena occurring during the compaction of clays, and research on the mechanism of water exit from clays as a function of the pressure exerted in the field (1-1500 Kg/sq cm).

--Prof. Fernando Veniale

#### CLAY SCIENCE IN SOUTH AFRICA

In May 1970 Dr. R. C. Mackenzie, The Macaulay Institute for Soil Research, Aberdeen, Scotland, visited a number of laboratories and research groups and gave a series of seminars on thermal analysis of clay minerals. The South Africa Ceramic Society sponsored a two-day Symposium in September 1970 that was extremely successful with an attendance of about 180 people on each day.

A Symposium has been arranged for Sept. 22-23, 1971 on the topic "Fabrication of Ceramics". Prof. J. P. Roberts of Leeds University, England will visit South Africa on a lecture tour sponsored by the South Africa Ceramic Society and the C.S.I.R. during September 1971. He will also give two lectures at the Symposium.

--E. R. Schmidt

#### SOVIET GROUP FOR CLAY STUDY

In May 1957 a conference on clays was held in Lvov and was attended by specialists in experimental methods, mineralogy and geology of clays, and clay technology. The collected papers were published under the title "Investigation and Utilization of Clays" (Lvov, 1958). The conference established a Commission on Clays under the chairmanship of the corresponding member of the USSR Academy of Sciences, Prof. F. V. Chukhrov. Numerous local commissions on clays were founded in the various Soviet republics and annual meetings have been actively supported by clay workers. Following the clay conference in Tbilisi (Georgian SSR), participants made excursions to deposits of bentonite clays at Gumbri (bentonite bed among Cretaceous limestones) and Askana (montmorillonized alkaline-dacite tuffs). After the conference in Ashkhabad (Turkmenia) the bentonite deposit of Oglanly was visited and the conditions of clay mineral deposition in the Kara-bogas-gol Bay (Caspian Sea) were examined.

Participants in the 1964 conference in Kiev examined the Glukhovets kaolin deposit (largest in the Soviet Union) and other deposits confined to the crust of weathering. In 1967 an All-Union Conference was held in Moscow; topics discussed in this meeting included methodology, constitution of clay minerals,

genesis, and utilization. Alma-Ata (Kazakh Republic) was the site of a conference in 1968 which dealt extensively with the genesis of high quality sodium-bentonites in the recently discovered Tien-Shan deposit. Considerable attention was also given to the elucidation of conditions of clay formation in the weathering crust, a particular example being the kaolins of the Alexeevskoje deposit in Kazakhstan.

Many reports were submitted by Soviet specialists to the Copenhagen conference of the International Commission on Clay as well as to international conferences in Brussels (1958), Prague (1960), Stockholm (1963) and Jerusalem (1966) as well as to a conference in Paris (1961).

Collected reports of Soviet authors for the conferences in Brussels and Copenhagen were published as follows: (1) Materials on the Geology and Utilization of Clays in the USSR. Reports at the International Conference on Clays, Brussels (1958), USSR Acad. Sci., and (2) Reports for the Meeting of the International Commission on Clay Study. Moscow, USSR Acad. Sci., 1960.

A large portion of the investigations reported in these publications was devoted to methods of studying clay minerals: electron microscopy, electron diffraction, thermal analysis, etc.

Among monographs and collected papers describing results of methodological investigations which should be noted are the following:

Zvyagin, B. B. 1967. Electron Diffraction Analysis of Clay Mineral Structures. Plenum Press, N.Y.

Gritsaenko, G. S., Zvyagin, B. B., Boyarskaya, R. V., Gorshkov, A. I., Samotoin, N. D., and Frolova, K. E. 1969. Methods of Electron Microscopy of Minerals. Nauka, Moscow.

Ovcharenko, F. D., Nichiporenko, S. P., Kruglitsky, N. N., Tretinnik, V. Y. 1965. Research on the Physico-chemical Mechanics of Clay Mineral Dispersion. Akad. Nauk, USSR, Kiev.

Piloyan, G. O. 1964. Introduction to the Theory of Thermal Analysis. Nauka, Moscow.

Vikulova, M. F. (Editor). 1957. Manual of Methods for Mineralogical and Petrographic Clay Study. Gosgeoltekhizdat, Moscow.

Lithological-mineralogical investigations of argillaceous rocks have been widely developed. A great deal of research work is carried out in the Soviet Union on the study of ancient crusts of weathering since deposits of many economically important minerals such as kaolin, nickel silicates, etc. are associated with such crusts. Results of some weathering crust studies are contained in a collection of eleven papers being published by members of the Commission on Clays as well as several monographs. In one of the latter (V. P. Petrov, Fundamentals of Ancient Weathering Zones. Nedra, Moscow, 1967) concepts about the genesis of the crusts of weathering and associated minerals of economic importance are discussed.

Books describing the characteristics and properties of clay deposits in specific regions include:

Ovcharenko, F. D., Kirichenko, N. G., Kovalenko, D. I., and Rastrenenko, A. I. 1958. Ukrainian bentonites. Akad. Nauk USSR, Kiev.

Petrov, V. P., and Rubanov, I. V. 1960. The kaolins of Angren, their material composition, formation conditions and uses. Akad. Nauk Uz. SSR, Tashkent.

Kazanski, Yu. P., (Editor) 1965. Clays and clay minerals of Siberia. Nauk, Moscow.

Petrov, V. P. (Editor). 1968. Kaolin deposits and their genesis. Nauk, Moscow.

The Soviet groups for clay study devote much effort to bring the work of foreign investigators to the attention of Soviet specialists. A number of Soviet workers have participated in translating into Russian fundamental books on clay studies ("The X-ray Identification and Crystal Structures of Clay Minerals" edited by George Brown, "Clay Mineralogy" by R. E. Grim, etc.) as well as the most important papers from various journals.

Industrial organizations of the Soviet Union have shown great interest in clay studies and participate actively in the work of the clay groups in areas of industrial uses of clays and related areas of clay technology.

The intense interest in clay research and its wide application in the national economy are very important stimuli for the further expansion and intensification of investigations of clays in the Soviet Union.

--F. V. Chukhrov and V. P. Petrov

#### SPANISH SOCIETY FOR CLAY MINERALS

The first conference arranged by the newly formed Sociedad Espanola de Argillas with J. L. Martin Vivaldi as president and J. M. Serratosa, Instituto de Edefologia, C.S.I.C. serrano 115 bis, Madrid-6, as secretary was held in Madrid June 1-3, 1970. This was primarily a bi-national meeting of Spanish and Belgian clay mineralogists, with smaller numbers from France, Germany and Great Britain.

The Madrid conference had an excellent program with 35 papers relating to 2 main topics each introduced by a 1-hour review lecture, namely "Clay-Water Interactions" with a review by J. J. Fripiat, and "Clay-Organic Complexes" with a review by G. W. Brindley.

The role of water in relation to the properties of layer silicates, including the formation of organic complexes, was a major theme of both sections of the conference. Infrared spectroscopy was the most discussed technique, but X-ray diffraction, NMR and other physical methods were well represented.

The comments of Dr. G. W. Brindley concerning this conference are particularly relevant in view of the forthcoming A.I.P.E.A. International Clay Conference to be held in Madrid, June 25-30, 1972. He said, "(1) Our Spanish hosts did a wonderful job of organization and there can be no doubt that the International Clay Conference, which is to take place in 1972 in Madrid (the A.I.P.E.A. Conference), will be splendidly arranged. (2) The quality of Spanish research in clay mineralogy is very good and it is regrettable that some of us have not studied the Spanish literature as we should have done; this conference will be an incentive to pay more attention to the work of our Spanish colleagues."

The Proceedings (Proceedings of the Spanish-Belgian Meeting on Clay Minerals. C.S.I.C. Madrid, Spain, Dr. J. M. Serratosa, Editor. 1970. \$10.00) contain the 35 papers presented at the Spanish-Belgian Meeting on Clay Minerals, Madrid, June 1-3, 1970 and two review lectures: (1) Clay-water Interaction by Prof. J. J. Fripiat and (2) Clay-organic Complexes by Prof. G. W. Brindley. The Proceedings can be ordered from: Miss M. T. Miranda, Assistant Editor, Instituto de Edafologia C.S.I.C., Serrano, 115 bis, Madrid-6, Spain.

#### THE CLAY MINERALS SOCIETY U.S.A.

The 19th Annual Clay Minerals Conference was held October 12-17, 1970 in Miami Beach, Florida with Dr. W. E. Moody serving as Chairman of the Local Committee. Fifty-nine papers were presented in the technical sessions which included sessions on Structure of Clays, New Instrumentation in Clay Analysis, Diagenesis of Clays, and two General Sessions.

Dr. Armin Weiss gave an Invitational Paper on "The Variety of Kaolinites Revealed by Intercalation Reactions" in the session on Diagenesis of Clays. He also visited a number of laboratories and research groups during his visit in the USA.

Dr. George Brindley, President of the Clay Minerals Society during 1970, brought honor to the Society as well as himself through his being awarded the Roebing Medal of the Mineralogical Society of America in November, 1970. Dr. Brindley was succeeded as President by Dr. John F. Burst, General Refractories Co., Philadelphia, Pa. Dr. Sturges W. Bailey, Dept. of Geology, University of Wisconsin, Madison, Wis., will serve as Vice-President of the Clay Minerals Society during 1971.

Prof. Paul F. Kerr, Department of Geology, Columbia University, New York, was honored by the Society during the Miami meeting by being named Distinguished Member for 1970.

As stated elsewhere in this Newsletter, the 20th Annual Clay Minerals Conference with joint participation by the Mineralogical Society of America, will be held in Rapid City, South Dakota August 8-12, 1971.

The 1972 Clay Minerals Society Meeting is planned for Woods Hole, Massachusetts, Sept. 11-14, 1972. Dr. John C. Hathaway is Local Chairman and Dr. R. T. Martin of M.I.T. will serve as Program Selection Chairman. A symposium based on clays in the marine environment is proposed as part of the technical program.

#### UNITED STATES--JAPAN COOPERATIVE SCIENCE PROGRAM: SEMINAR ON AMORPHOUS CLAY MATERIALS

Amorphous clay materials are abundant both in Japan and in the Pacific Northwest of the United States and Hawaii. They have been studied widely in both countries, and, although considerable progress has been made, many problems remain to be solved. A seminar to take stock and plan future research was held in Fukuoka, Japan, Sept. 17-19, 1969 under the auspices of the Cooperative Science Program. In addition to the members of the delegations from Japan and the U.S. (coordinators were S. Aomine, Kyushu University, and H. van Olphen, Natl. Acad. Sci.) scientists from four other countries

(Australia, Germany, Israel, and U.S.S.R.) participated. The topics discussed included: definitions and nomenclature, characterization, occurrence, genesis, synthesis, soils, and industrial applications. A summary of this meeting has been published in SCIENCE, January 8, 1971, Vol. 171, pp.91-92.

#### NEW PUBLICATIONS

Proceedings of the International Clay Conference 1969, Tokyo, Japan. Vol. 1, Editor-Lisa Heller, 935 p. Israel Universities Press, Jerusalem (1969)

Proceedings of the International Clay Conference 1969, Tokyo, Japan, Vol. 2, Editor-Lisa Heller, 246 p. Israel Universities Press, Jerusalem (1970)

The comments which follow are taken from a report by Dr. G. W. Brindley on the International Clay Conference in Tokyo which was published in Geotimes, February 1970, pp. 20-21.

"The conference was organized in these main sections: (1) clay mineral structures, (2) clay mineral genesis, (3) clay-water systems and ion exchange, (4) clay-organic compounds, (5) industrial applications, (6) general without recourse to parallel sessions. Any report on the highlights of a conference is likely to reflect the personal bias of the reporter and the following is no exception.

In section 1, V. A. Drits and his co-workers (USSR) discussed a detailed structure analysis of an iron biotite and the general relations between structural parameters and chemical compositions of trioctahedral micas. An outstanding point was that by taking into account a broader range of data than Radoslovich had considered previously, some modifications were required in the general conclusions. Particularly it seems that the substitutions of Al for Si in the tetrahedral sheets of micas do influence the over-all lattice parameters, particularly  $b$ , contrary to the conclusions reached earlier. Another aspect is the seemingly significant interaction between the O-H bonds (which in trioctahedral structures are along  $c^*$ ) and the interlayer cations, principally K ions. I have the impression that as the data on which conclusions are based become broader in scope, so it becomes increasingly evident that all components in a layer structure play their parts (though all parts are not equal), in determining the final structural parameters.

F. V. Chukhrov and his colleagues (USSR) reported structural relations between chrysocolla, medmontite, and Cu-halloysite. Chrysocolla may have dioctahedral Cu-O<sub>2</sub>H sheets joined by Si-O sheets with the tetrahedra pointing alternately in opposite directions. The mineral may be formed by a process involving increasing replacement of Al by Cu in halloysite. Medmontites are thought to be mixtures of chrysocolla and mica. Electron-microscope and diffraction data, supported by DTA and IR data, provide the main basis for these conclusions.

Dehydroxylation studies were reported by several authors; P. G. Rouxhet et al. (Belgium) and F. Freund (Germany) emphasized the important role of proton tunnelling on the formation of water molecules within structural domains bounded by imperfections. While acknowledging the importance of these concepts, I emphasized that the rate-controlling step for dehydroxylation kinetics may still be the removal of H<sub>2</sub>O molecules from within the structure by diffusion. An important statement by Rouxhet is worth quoting: "The study of diffusion and other kinetic laws should be considered as contributing to an understanding of the progress of the reaction rather than to an explanation of the dehydroxylation mechanism."

The interactions of organic agents with kaolinite were discussed in several papers. Range (K.J. and A) and A. Weiss (Germany) showed that the intercalation properties of kaolinites and halloysites may depend on the degree and kind of disorder, as well as on the intercalating agent. Four types of kaolins were described on the basis of their behavior towards hydrazine and water; even within one seemingly homogeneous sample, two or three of these types may be present. The term "fire-clay mineral" (which I used in 1948 and have since tried unsuccessfully to eliminate) may become more respectable as a result of these studies. A. Wiewiora and I (USA) reported on the variable degree of intercalation of K-acetate into kaolinites, and surprisingly found that small particles (<0.5 $\mu$ m) seemed to intercalate much less than larger particles (>1 $\mu$ m). Both A. Weiss (Germany) and L. Heller (Israel) independently agreed with the results and suggested possible explanations.

Palygorskite and sepiolite were studied in relation to loss of water at progressively rising temperatures and the related changes in X-ray powder diagrams. However, more detailed work is necessary before these changes will be fully understood. Two interesting papers on allophane dealt respectively with a structural formula based on chemical data (K. Imura, Japan) and a thermal study suggesting that allophane may have a sheet-like structure resembling kaolinite (Udagawa et al., Japan). In discussion, I suggested a defect kaolin model that might reconcile the chemical and structural results.

Interstratified clays received less attention than might have been expected, but one contribution of special interest by Shimoyama and Johns (Japan, USA) discussed a possible interstratification of kaolinite and montmorillonite, and its possible connection with the acid clay deposits in Japan. This type of interstratification has been mentioned in other recent work (for example, by L. G. Schultz et al.) and it seems that more attention should be given to this possibility.

Section 2, clay mineral genesis, with 26 papers and about 300 pages of text, occupied a major part of the conference. Selection of a few topics for particular mention from the wealth of material presented can only be highly personal. There were some excellent regional surveys of clay mineral formation, clay mineral characteristics, trace elements in clays, weathering processes, and other topics. Relatively few papers were concerned with laboratory alteration studies, but one which excited considerable interest, by J. Trichet (France), dealt with the nature of a volcanic glass, which showed "a differentiated phase composed of subspherical particles which have all the properties of allophanes and may be considered to be their precursors." There seemed to be a marked similarity between these particles and those found in the clay fractions of andosols. Minato and Utada (Japan), discussing halloysite formation in Japan, showed rounded, nearly spherical particles of halloysite thought to come from "the reaction of pyroclastic materials with rising water related to volcanism."

As H. van Olphen (USA) pointed out in his introductory remarks to section 3, clay-water systems and ion exchange, the principles of ion exchange are well understood from electrical double-layer theory. However, it is not always realized that the ion-exchange capacity of a mineral is a "material constant" only when surfaces of constant charge predominate; that is, the face surfaces of clay minerals. When broken bond surfaces predominate the surface charge and hence the ion-exchange capacity depends on the composition of the equilibrium liquid. Present research on ion exchange is directed to consolidation and refinement. Papers presented dealt with kinetics of ion exchange (R. Calvet and J. Chaussidon, France), a thermodynamic analysis of exchange site distribution, (R. van Bladel and R. Menzel, Belgium, USA), specific ion effects (for example, Cs retention in a paper by B. L. Sawhney, USA), isotopic exchange and application of ion-specific electrodes (R. L. Malcolm et al., USA). Interest in the thermodynamics of adsorption of water by clay minerals continues as reflected by 3 papers by F. D. Ovcharenko (USSR), H. van Olphen (USA), and G. L. Roderick et al. (USA). Other papers dealt with aging, particle size, adsorption, and structure formation in clay-water systems.

In the area of clay-organic interaction, an interesting paper by C. Ponnampuruma (USA) discussed the possible role of clay minerals in chemical evolution, leading to the appearance of the first living entity on Earth. Though not by any means a new idea (it has been discussed by Bernal and by Oparin) actual experimental work has been slender. This paper described the formation of biologically important sugars by refluxing formaldehyde over kaolinite or illite.

In the general section, R. L. Borst and Walter D. Keller (USA) showed fascinating electron scan micrographs (many are reproduced as stereoscopic pairs) of the API reference clay minerals. Magnifications of 5,000-10,000x were usually used to show interesting features of fractured surfaces. The results are obtained more directly than with replica techniques and also have considerable depth of focus giving an excellent view of the clay texture. Other interesting electron micrographs were shown by D. J. Greenland and G. K. Wilkinson (Australia) of the surface characteristics of clay minerals, and by Eiji Suito and his collaborators (Japan) of the layer structure of octadecylammonium montmorillonite."

Volume 2 of the Proceedings contains the chairman's introduction to each of the sections and the discussions and comments for the papers in Volume 1. Abstracts of additional papers, list of participants, and an index to Volumes 1 and 2 are also included in Volume 2.

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Bodenheimer Memorial Issue, Israel Journal of Chemistry, Vol. 8, No. 3, pp. 281-605, Weismann Science Press, Jerusalem, Israel, 1970.

A symposium which included sessions on soil, clay and geochemistry, as well as contributions in the fields of analytical, physical, inorganic, organic, and biochemistry, was organized to honor Dr. W. Bodenheimer on the occasion of his sixty-fifth birthday. Soil scientists, clay scientists, and chemists from various countries were invited to present papers and these are published in this special issue of the Israel Journal of Chemistry. Thirty articles and five notes, as well as a vita and list of publications of Dr. Bodenheimer are included in this issue.

Papers of particular interest to clay scientists include seven dealing with topics such as liquid junction potentials, flocculation and gel formation, conductance measurements, nonexchangeable ammonium in clays and shales, and adsorption of phosphate and silica by soils. Two papers describe

dissolution studies of aluminum hydroxides and quartz. Five papers report studies of organo-clay reactions. Mineralogical studies of soils are described in two papers. Weathering of rocks and genesis of minerals are treated in five papers. Chemical and biological studies of the Dead Sea are described in 4 papers. The papers dealing with soils, clays and geochemistry include the following:

1. A. Nissenbaum: Chemical analyses of Dead Sea and Jordan River water, 1778-1830. p. 281
2. I. Shinberg and A. Caiserman: Liquid junction potentials and transference numbers in montmorillonite suspensions. p. 289
3. R. F. Fitzsimmons, A. M. Posner and J. P. Quirk: Electron microscopic and kinetic study of the flocculation of calcium montmorillonite. p. 301
4. B. S. Neumann and K. G. Sansom: The study of gel formation and flocculation in aqueous clay dispersions by optical and rheological methods. p. 315
5. P. Jørgensen and P. F. Low: Conductance studies of Na-bentonite-water systems. p. 325
6. Y. Eckstein, D. H. Yaalon and S. Yariv: The effect of lithium on the cation exchange behavior of crystalline and amorphous clays. p. 335
7. S. Storgaard Jørgensen and B. D. Mitchell: The application of alkali dissolution techniques in the study of aluminum hydroxides and oxyhydroxides. p. 343
8. J. H. Henderson, J. K. Syers and M. L. Jackson: Quartz dissolution as influenced by pH and the presence of a disturbed surface layer. p. 357
9. U. Kafkafi, M. Giskin and J. Hagin: Phosphate and silica adsorption and desorption from soils. p. 373
10. N. Narkis, M. Rebhun, N. Lahav and A. Banin: An optical-transmission study of the interaction between montmorillonite and humic acids. p. 383
11. L. Heller and S. Yariv: Anilinium montmorillonites and the formation of ammonium/amine associations. p. 391
12. G. Lagaly, H. Stange, M. Taramasso and A. Weiss: N-n-alkylpyridinium derivatives of mica-type layer silicates. p. 399
13. G. W. Brindley and T. D. Thompson: Methylene blue absorption by montmorillonites. Determinations of surface areas and exchange capacities with different initial cation saturations (clay-organic studies XIX). p. 409
14. B. K. G. Theng and G. F. Walker: Interactions of clay minerals with organic monomers. p. 417
15. D. H. Yaalon and A. Feigin: Non-exchangeable ammonium ions in some clays and shales of Israel. p. 425
16. M. Gal: Clay mineralogy of Mediterranean brown forest soil. p. 435
17. U. Wlitzburger: Copper silicates in the Timna' ore deposit. p. 443
18. A. Singer: Weathering products of basalt in the Galilee. I. Rock-soil interface weathering. p. 459
19. Y. Nathan, Y. K. Bentor and U. Wurtzburger: Vein palygorskites in Israel and Sinai; their origin and symmetry. p. 469
20. E. Gavish and R. C. Reynolds: Structural changes and isomorphous substitution in illites from limestones of variable degrees of metamorphism. p. 477
21. G. P. Briner and M. L. Jackson: Mineralogical analysis of clays in soils developed from basalts in Australia. p. 487
22. R. E. Grim: The texture and composition of bentonites. p. 501

23. M. Schnitzer and G. Ogner: The occurrence of fatty acids in fulvic acid, a soil humic fraction. p. 505
24. I. R. Kaplan and A. Friedmann: Biological productivity in the Dead Sea. Part I. Microorganisms in the water column. p. 513
25. I. R. Kaplan and M. J. Baedeker: Biological productivity in the Dead Sea. Part II. Evidence for phosphatidyl glycerophosphate lipid in sediment. p. 529
26. H. Klein, J. Lapid and E. Mazor: The dissolved gases in the solar pond south of Elat. p. 535

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Geology of Clays, Weathering-Sedimentology-Geochemistry, by Georges Millot, Professor of Geology, University of Strasbourg, France. Translated by W. R. Farrand, Dept. of Geology and Mineralogy, University of Michigan, Ann Arbor, and Helene Paquet, Centre de Sédimentologie et de Géochimie de la Surface, Strasbourg, France. Co-published by Springer-Verlag New York Inc. and Masson et Cie, Paris, 1970, 450 pp., U.S. \$16.80.

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Introduction to Mineralogy, Crystallography and Petrology, Revised Second Edition, by Carl W. Correns, Sedimentpetrographisches Institut der Universität Göttingen, Germany. Translated by W. D. Johns, Dept. of Geology, University of Missouri, Columbia, in cooperation with J. Zemann (Part 1) and S. Koritnig (Mineral Tables). Published by Springer-Verlag New York Inc. 1969, 485 pp., U.S. \$12.40

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