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

AIPEA NEWSLETTER

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Symposium on Kaolin Deposits and their Genesis, Prague 1968

The programs of the Sessions of the International Geological Congresses generally involve symposiums on important mineral raw materials. The Organizing Committee of the 23rd Session of IGC held in August 1968 in Prague (Czechoslovakia) had proposed to sponsor a symposium entitled "Kaolin Deposits and their Genesis" (Symposium I) at the occasion of the Congress. The incessantly rising kaolin production and the many-sided use of kaolin in various industrial branches call forth an increased interest in the origin of kaolin deposits, processes leading to kaolinization and their causes, mineralogical and chemical composition of kaolins and their influence on technological properties of kaolins. The aim of the Symposium was also to discuss some economic-geological aspects e. g. the problems of the search for and investigation of kaolin deposits, general trends in the kaolin mining and international trade, and a synopsis of kaolin deposits and reserves in individual countries was to be elaborated. The intention of the organizers – to show to the participants different types of kaolin deposits on a relatively small territory of Czechoslovakia – was one of the reasons why this Kaolin symposium took place in Czechoslovakia during the 23 IGC; these deposits form an important raw-material basis of the country's ceramic industry and of other industrial branches.

Symposium I was preceded by excursion A-20 to western Bohemia held Aug. 13–17 (leader M. Kuzvart). Prof. Dr. W. D. Keller gave an account of this excursion in Geotimes, November 1968. The kaolin deposits visited belong to two different genetic types. The first type was formed by decomposition of arkoses and arkosic sandstones of Upper Carboniferous age deposited in the Plzen coal basin. Kaolinization occurred partly during transport and sedimentation of clastic material that resulted from the weathering of old granite massifs and their sedimentary mantles. The uppermost parts of Carboniferous arkosic formations underwent kaolinization in younger geological periods, presumably in Late Cretaceous and Early Tertiary. The workable kaolin deposits (containing 20–25 % of washable clay substance, *mainly triclinic kaolinite) attain a depth of 30–70 m. Arkoses,* however, are kaolinized up to a depth of 200 m. The kaolin deposits near Chlumcany and Kaznejov in the Plzen basin were examined as well as

the occurrences of residual ocher and ocherous kaolinite-illitic clays that originated by fossil weathering of pyritic slates of Proterozoic age near Horní Lukavice. An abandoned quarry near Hromnice not far from Plzen was visited in which the pyritic slate had been mined for the manufacture of fuming sulphuric acid in the first half of the last century.

A second genetic type of kaolins is represented by the wellknown deposits in wider surroundings of Karlovy Vary and it is interpreted by Czech geologists as relics of the kaolinic crust of pre-Oligocene weathering of Variscan granites. Petrographic character of kaolins is controlled by the mineralogical composition and structure of the parent rocks (biotitic normal granite, lithionic autometamorphic granite, aplitic, fine to coarse-grained or porphyric facies etc.) and by the intensity of kaolinization. In some parts the top sections of kaolin deposits are contaminated by Fe compounds migrated from the overlying pyroclastics of the Miocene volcanogenic complex. Kaolinization persists to a depth of 60 and more metres; usually only the upper zone of perfectly kaolinized granite (10–30 m thick) is exploitable. Besides the open pits in Podlesí near Sadov and in Bozícany also some exposures of the parent rocks were studied.

The participants in the excursion also visited the famous deposits of kaolinitic clays of Pliocene age in the graben-like Cheb Basin near the western frontier of Czechoslovakia. The deposits originated by redeposition of primary kaolins of fossil weathering crust of granites of the Smrciny Massif and of phyllites bordering and underlying the Tertiary sediments of the Cheb Basin. The refractory bond clays (s. c. blue clay) in the open pit at Skalná (Vildstejn) and the whiteware and refractory clays ("secondary kaolins") in the Nová Ves pit were examined. Attention was also focused upon the products of Pliocene-Pleistocene volcanism in this area (volcano at Komorní Hurka near Cheb, moffettes and mud craters in Hájek-Soos near Frantiskovy Lázne). Observations were made of the hot-water spa at Karlovy Vary and cold-water spas at Frantiskovy Lázne and Mariánské Lázne. The chinaware factory, historic and modern displays of fine china, the factory display of the famous Moser glass works were toured. The participants also had an opportunity to get acquainted with some places of high historic and cultural value. A guide-book (Kaolin and Clay Deposits in West Bohemia, Guide to Excursion 20 AC, IGC, XXIII. Session Prague 1968) and geological maps of the visited areas had been distributed to the participants prior to the opening of the excursion.

During the Congress meetings in Prague the technical sessions of Symposium I were planned. As already mentioned in the 1st and 2nd Circular the abstracts of each paper to be presented at the Congress had to be sent to the Organizing Committee before February 1, 1967. Altogether 32 abstracts arrived for the Symposium on Kaolin Deposits, namely 8 from Czechoslovakia, 6 from U.S.S.R., 5 from UK, 2 from GDR and Japan, and 1 from U.S.A., Denmark, Italy, Yugoslavia, South Africa, Cuba, Tunisia and Chile. The object of some of these contributions was somewhat remote from the principal problems of the Symposium and that is why they were not accepted by the Editorial Board; some of them were recommended to other sections of the Congress or to the International Mineralogical Association Session. 23 abstracts were printed (IGC, Rpt. of the Twenty-Third Session, Czechoslovakia 1968, Abstracts, Prague 1968, pp. 360–372), together with one abstract recommended by the Editorial Board of the Section 6. Geochemistry.

The subjects of the abstracts are the problems of methodology (membrane colorimetry of kaolinized rocks, critique of analytical procedures in clay mineralogy, methods of prospecting for kaolin), geochemical problems (geochemical trend of kaolin weathering), genetic problems (zonality of hydrothermal deposits, formation of halloysite and kaolinite through the alteration of ultramafic rocks, recent hydrothermal argillitization, kaolinic wall-rock alteration), mineralogical and petrographical questions (weathering of Fe-Mg micas, mineralogy of sedimentary halloysite deposits, petrography and petrographic types of kaolins) and technological problems (relationships between mineralogical composition and technological properties of kaolins). A number of abstracts were of purely regional character and therefore some of the authors had been requested to complete their contributions so that they might be published in regional volumes of the Symposium dealing with the kaolin deposits of individual countries (UK, GDR, U.S.S.R.).

The complete text of the papers selected for the Symposium session had to reach the Secretary General before August 1, 1967. Only 11 complete texts arrived by this date. All of them were approved for print in the 14th vol. of Congress publications (IGC, Proceedings of Symposium I. Genesis of Kaolin Deposits, Prague 1968, pp. 1–135) and assigned into the program of the sessions. The printed texts of all these papers had been distributed to the members of the Congress prior to the meetings. The sessions of Symposium I were scheduled for August 21 and 22, 1968. The organizers of the Symposium deeply regret that with regard to the occupation of Czechoslovakia by the troops of 5 member-countries of the Warsaw Pact the sessions, similar to other actions of the International Geological Congress, had not been allowed to complete their charted course. In view of the fact that some foreign participants in the Symposium could not walk to the Congress Hall because of difficult traffic situation or because they were well advised to stay in their hotels as much as possible, others rode prematurely from Prague, it was necessary to substantially change the program of the session.

The first day of the session (Aug. 21) was chaired by J. Kukla and M. Kuzvart (Czechoslovakia). J. Vachtl, secretary of the Symposium, welcomed the participants and briefed on the organization of the Symposium and on expected changes of its program. The Proclamation of the Czechoslovak Academy of Sciences condemning the military occupation of Czechoslovakia as an outrageous violation of the principles of international law and sovereignty of an independent state was read. In the morning the following lectures were given: "Petrography of Kaolins from Ghana" (J. Neuzil, M. Kuzvart, Czechoslovakia) and "Carboniferous Bauxites and Argillites" (Z. Górzynski, Poland). Both the lectures have been printed in full text in the 14. vol. of the IGC Proceedings. D. Green (Fiji) completed the lecture of M. Kuzvart by a remark on the alteration of granitic rocks and feldspathic gneisses beneath Waterberg Sandstones along the plane of unconformity implying leaching by percolating waters. He also added that kaolinic Karroo mudstones indicate kaolinic weathering in Permian times (when laid down they were kaolinic in character). The present-day weathering changed the plasticity of these mudstones but did not alter the mineralogical character of the material. A discussion on the influence of climate on the processes of kaolinic and lateritic weathering (J. Vachtl, Czechoslovakia) and on the volume changes accompanying kaolinization and bauxitization of the Nova Ruda gabbro (D. B. Pattiaratchi, Ceylon) linked up with the contribution of Z. Gorzynski.

The afternoon session included the "Discussion on Granulometry and Chemical Composition of Czechoslovak Kaolins" (M. Kuzvart, J. Neuzil, Czechoslovakia). Its full text appeared in Acta Universitatis Carolinae, Geologica, Prague 1968, Nos. 1–2, pp. 129–138. The paper deals with granulometric relations and changes in chemical composition of kaolins of some main workable territories of Czechoslovakia. J. Vachtl (Czechoslovakia) read the lecture "Review of Kaolin Deposits of Europe" in which the complex synopsis of European kaolin deposits, an attempt to define their geological assignment, the synopsis of the opinions on their age and genesis, were given, A substantial part of this paper will be published in the Proceedings of Symposium I, vol. 15, Kaolin Deposits of the World, Europe (in print).

The session of the Symposium, Aug. 22, was held in a somewhat consolidated atmosphere with greater number of participants. P. Graff-Petersen and J. Bondam (Denmark) were the chairmen. P. A. Sabine (UK) read the lecture "Kaolinitic Wall-rock Alteration of the Perran Iron Lode, Cornwall", and J. Bondam (Denmark) read the lecture "Geochemical Distribution of Major Elements in some Kaolin Deposits". Full text of both the lectures has been published in the Proceedings of Symposium I, vol. 14 (1968). A question concerning the lecture of P. A. Sabine was raised about the methods of determination of kaolinite (S. G. Sarkisian, U.S.S.R.). In his paper J. Bondam followed the distribution of major elements in residual kaolins of Rønne (Denmark), Sedlec and Ruprechtov (Czechoslovakia) and the law of the changes of geochemical parameters during kaolinization. The discussion of this theme was concerned with mutual leaching of K and Na during weathering (W. F. Bradley, U.S.A.), the possible influence of pH variations of hypergene solutions exerted upon the character of

paragenesis phyllosilicates of kaolins (I. Th. Rosenqvist, Norway) and the speed of kaolinization processes (Ann-Marie Asklund, Sweden). The third lecture of this morning session dealt with the "Methods of Prospecting for Kaolin in the Karlovy Vary (Carlsbad) Area, Czechoslovakia" (J. Kukla, Czechoslovakia). This paper summarized the results of a long-time investigation of the most important kaolin area in Czechoslovakia and has been published in the mentioned issue of Acta Universitatis Carolinae, Geologica 1968, Nos. 1–2, pp. 139–149. In the afternoon session M. Störr (GDR) read a lecture "Die Beziehungen zwischen dem Stoffbestand der Kaoline in der DDR und deren technologischen Eigenschaften". The following discussion was concerned with the ascertainment of trace elements in kaolins and the possibility of determination of primary rocks from the composition and structure of sedimentary kaolins (G. F. Krasheninnikov, U.S.S.R.), the composition of the mixed-layer clay minerals of the kaolins of the GDR (J. Bondam, Denmark). The session proceeded with a comprehensive paper by M. Kuzvart (Czechoslovakia) "Review of Kaolin Deposits of Asia, Africa, America and Australia" that will be published, similar to the paper on the Deposits of Europe, in the Proceedings of Symposium I, vol. 16, Kaolin deposits of the World, Other continents (in print). The paper by D. B. Pattiaratchi (Ceylon) entitled "Kaolin Deposits of Ceylon" was a final lecture of the day. In discussion D. B. Pattiaratchi answered the questions concerning the differences in quality between the primary and secondary kaolins in the Boralesgamuwa deposit, the criteria for distinguishing the redeposited kaolin from the primary one and the terminology of the kaolinic rocks (J. Kukla, Czechoslovakia). He also answered the question about the relative distribution of titanium between the rutile and anatase forms (W. F. Bradley, U.S.A.). J. Vachtl (Czechoslovakia) provided concluding notes on the course of the Symposium and made a proposition that an international cooperation be applied in the solution of the genesis of residual kaolins, in the correlation of criteria for the determination of the genesis of these kaolin deposits and in the correlation of terminology of kaolinic rocks. D. B. Pattiaratchi (Ceylon) spoke on behalf of the foreign participants in the Symposium and expressed thanks to the organizers of the Symposium and sympathies with the Czechoslovak scientists.

The military events made it impossible to held the post-Congress excursion 20 C (with the itinerary identical with that of excursion 20 A) to which numerous participants in the Symposium had been looking forward.

The aim of the Symposium was not only to provide the opportunity for discussions on general problems of the genesis and composition of kaolins but also to collect the data on kaolin deposits of individual countries, on their reserves and on the production and consumption of kaolin in national economies. To this purpose the Organizing Committee of the 23rd International Geological Congress asked in a letter of March 1966 all the National Geological Committees or State Geological Surveys of individual countries to appoint institutions or editors responsible for the elaboration of national contributions on kaolin deposits of their countries. At the beginning of May 1966 the designated institutions or persons were sent a technical circular with detailed instructions for the elaboration of the report in demand. National contributions on kaolin deposits had to be sent by November 30, 1967. However, only 14 contributions were received by the end of 1967 instead of 33 that had been promised by the national institutions. That is why the editorial term had to be prolonged. The last contribution to be included in the Congress publications reached the Editorial Board at the beginning of May 1968. Altogether 16 contributions advisable for print from Europe and 18 from other continents were transmitted. Unfortunately, the biggest kaolin producers (U.S.A. and China) did not send their national contributions and the contribution from India could not be recommended for print due to its incompleteness. Two volumes on Kaolin Deposits of the World (Proceedings of Symposium I. vol. 15: Europe, vol. 16: Other continents) will be published in Prague in 1969. Although it has proved impossible to collect exhaustive data from all countries known to be kaolin producers, it will be the first survey of kaolin deposits ever presented at the International Geological Congress.

Josef Vachtl
Secretary of the Kaolin Symposium
Head, Department of Geology
Charles University, Prague 2
Czechoslovakia

International Congress of Soil Science, 1968

The host city for the Ninth International Congress of Soil Science held during the period August 6–16, 1968 was Adelaide in South Australia. Technical sessions were held on the campus of the University of Adelaide. Some 865 delegates from 52 countries attended the Congress, 400 of them travelling from countries other than Australia. The Congress was divided into seven Commissions comprising Soil Physics, Soil Chemistry, Soil Biology, Soil Fertility, Classification, Technology, and Soil Mineralogy. Thirty minutes were allotted for each of the 313 papers presented. These were preprinted in four volumes and distributed prior to the meetings, thus allowing authors the opportunity to present their work in summary form and leave a substantial period for comment and discussion. A simultaneous translation service in English, French and German was provided.

The Soil Mineralogy Commission sessions were organized under four main headings (1) Surface Chemistry, (2) Structure and Formation of Clays, (3) Weathering and Soil Formation and (4) Soil Nutrients. Although the meetings of the various Commissions were mainly concurrent, Mineralogy joined with other Commissions on occasion, viz. with Soil Physics for a session on Clay-Electrolyte-Water Interactions; with Soil Chemistry for sessions on Clay-organic Systems, Cation Exchange and Chemical Weathering; and with Chemistry and Soil Fertility for the Soil Nutrient sessions. All sessions involving Mineralogy were well attended and discussions were generally lively and incisive.

Papers covered a wide range of topics including the influence of organic compounds and of clay minerals on the formation of iron oxides and hydroxides; specific anion adsorption on hydroxides; crystal structures of the layer silicates with particular attention to the various types of mixed-layering encountered in practice and interpretation of the X-ray diffraction effects produced; the mineralogy of soil-clays from various parts of the world and the weathering processes operating in soil profiles; surface fields and the protonation of adsorbed molecules at clay mineral surfaces as well as proton migration within the silicate layers.

Several papers dealt with allophanic soils and much interest was shown in the characterization of clay minerals by infra-red spectroscopy, a technique which has acquired considerable sophistication in recent years. Considerable attention devolved on the availability of plant nutrients and particularly potassium which, although present in the feldspars and micas of many soils, is often released at a rate less than necessary for optimum plant growth. The rate of release, the mechanism of release and the effect of particle size on these were all considered. Almost a day was devoted to phosphates, topics ranging from crystal structure determinations of naturally occurring mineral phosphates to mechanisms whereby phosphorus is rendered unavailable to the plant .

Field trips to different parts of the Australian continent were available both before and after the Congress sessions. These tours provided delegates with the opportunity of viewing an extensive range of soils developed on land surfaces continually exposed to weathering for very long periods, in some instances from late Tertiary times, a feature which distinguishes them from the majority of European and North American soils. Although Australia is the driest of the continents in general terms, its soils have developed on a wide range of parent materials and under climatic conditions ranging from alpine and wet tropical to extremely arid. Tours of from 7 to 13 days duration covered the west, north and eastern parts of the country and three 7-day tours of New Zealand were offered. For the middle week-end of the Congress, a number of one and two-day local tours were organized so that areas within relatively easy reach of Adelaide could be inspected.

During the Congress period, laboratories opened for inspection included those of the

Waite Agricultural Research Institute, the Australian Wine Research Institute and the Commonwealth Scientific and Industrial Research Organization's Divisions of Soils, of Horticultural Research, and of Mathematical Statistics. Exhibitions of "Soil Science Topics" and of Australian-made agricultural and scientific equipment were open for the whole period, and an extensive series of musical and other entertainments, wine-tastings, receptions and other social functions was arranged.

The detailed planning which went into the organization of the Congress by the various Committees was evident in the smooth running of technical sessions, social events and field trips, all of which went without sign of a hitch.

During the Congress, a meeting of the International Soil Science Society Council decided that the Tenth International Congress of Soil Science will be held in the U.S.S.R. in 1974 under the Presidency of Professor V. A. Kovda.

In view of the influx of eminent clay scientists from overseas to the Congress, the Australian Clay Minerals Society decided to sponsor a one-day Conference to follow immediately after the Soils Congress. Here the aim was to shift the emphasis towards aspects of clay mineralogy other than those most directly related to soil science. Three colloquia each of approximately two hours duration were introduced by invited speakers, who were asked to seek controversial issues where possible and were allowed 15 minutes each in which to do so. The topics and principal speakers were: 1. Mineral-organic Interactions (J. J. Fripiat and G. F. Walker, Chairman J. P. Quirk); 2. Intercalation and Intersalation (D. M. C. MacEwan, K. Wada and J. L. White, Chairman K. Norrish); and 3. Interactions of Ions with Clay Surfaces (G. H. Bolt, W. D. Kemper and H. Laudelout, Chairman D. J. Greenland). Some 200 delegates attended. It was evident from the out-spoken and remarkably animated nature of the discussions which followed, that the participants were by no means as enervated by the previous two weeks of concentrated activities as might have been expected.

G. F. Walker
Division of Applied Mineralogy
C S I R O, Melbourne, Australia

The Clay Minerals Group
of the Mineralogical Society of Great Britain

The Group "came of age" in November 1968 when it held its 21st Annual General Meeting. It now consists of approximately 230 members, mainly from Great Britain but also from 27 other countries throughout the world.

The activities of the Group include meetings for discussion and paper reading and the publication of reviews and papers of original research in clay mineralogy.

Meetings are held twice a year alternately in London and in provincial towns or cities in a university department of geology. From time to time an eminent clay mineralogist from abroad is invited as guest lecturer. At the spring meeting of 1968 Professor W. D. Keller of Missouri spoke to the Group at Southampton on "environmental aspects of clay mineralogy". At other meetings the Group occasionally combines with clay minerals groups from the Continent or, when the subject of the meeting is appropriate, with societies from related disciplines. A most successful joint meeting with the Groupe Belge des Argiles was recently held in London on the subject of "infra-red studies of clay minerals".

Three different types of publication are produced for the Group. Notes and news of activities are given in a circular, shortly to be incorporated in a more comprehensive Bulletin of the Mineralogical Society. Papers of original research and occasional review articles are published in the journal Clay Minerals. Reviews dealing with particular aspects of clay mineralogy and covering the whole range of clay minerals are published as Monographs. Those at present available are "The X-Ray Identification and Crystal Structures of Clay Minerals" and "The Differential Thermal Investigation of Clays". Two new Monographs dealing with electron-optical studies of clays and the clay mineralogy of British sediments are in preparation.

A. H. Weir
Hon. Group Treasurer and Secretary
Rothamsted Experimental Station
Harpenden, Herts., Great Britain

The Swedish Society for Clay Research

As a direct consequence of the clay meeting in Brussels in 1947 the Swedish Society for Clay Research was formed on the initiative of the Swedish delegate, the late Dr. Gunnar Assarsson. The inaugural meeting was held in Höganäs on November 4th, 1948. In May 1968 the Society celebrated its 20 years anniversary at the same place, AB Höganäs acting as host at both occasions. At the spring meeting 1968 Mr. Christer Enberg, head of the Swedish brick laboratory, was elected honourary member.

The Society acts on a wide basis, the only requirement for persons wishing to become members being an interest in clay research. The aim of the Society is to bring together interested persons to lectures and discussions dealing with problems concerning the properties of clays.

The Swedish Society for Clay Research is the only one of its kind in Scandinavia and has members from all the Scandinavian countries. This type of violation of the frontiers has in an obvious way stimulated the activities within the Society.

The members represent different fields, such as ceramics, cement and concrete research, soil mechanics, geology, silicate chemistry, pedology, hydrology, and so on.

The Society has had two full-day meetings every year, usually in Stockholm, to which both national and international lecturers have been invited. Occasionally meetings have been arranged outside of Stockholm, often in connection with a visit to an institute or a factory or with field excursions.

Among the larger arrangements organized by the Society, besides the 1963 International Clay Conference, a mention may be made of a three days meeting on clays and ion-exchange held in Gothenburg in 1955 together with the Academy of Technical Sciences and of a series of lectures by Professor Ph. Low from University of Purdue, U.S.A., in collaboration with Government authorities and universities in the Scandinavian countries.

The Society issues a publication entitled "Reports from the Swedish Society for Clay Research" in which above all reprints of papers are published (the original papers being published in the transactions of the Geological Society of Sweden, GFF).

When in the beginning of the 1960-ies it was decided to organize separate International Clay Conferences sponsored by C I P E A, now A I P E A, the Swedish Society for Clay Research was entrusted with the arrangement of the first conference. It was held in Stockholm in August 1963 and was followed by field excursions to various areas in Scandinavia. The conference attracted about 200 participants from 25 countries.

For the moment the Society has about 160 members and is moreover supported by industries having connections with clay research and technology.

Staffan Modig
Secretary, S S C R
Geological Survey of Sweden
Stockholm, Sweden

Groupe Français des Argiles

Bulletin of the Groupe Français des Argiles

The Groupe Français des Argiles which was one of the founders of A I P E A was initially set up by the Centre National de la Recherche Scientifique in France (CNRS) and remained for many years part of its organization. Owing to its expansion the Groupe Français des Argiles in 1968 became a fully independent scientific association, keeping the original name. Besides, it has kept close links with the CNRS.

The President, Professor *Yves Letort,* and the Vice President, Professor *Georges Millot,* are continuing their functions in the new association.

The scientific activities of the Groupe Français des Argiles continued without break and the publication of the Bulletin of the Groupe Français des Argiles was not interrupted.

Application for membership of the association and subscription to the bulletin should be sent to
Secretariat du Groupe Français des Argiles
23, rue de Cronstadt
F-75 Paris 15e, France.

Book Reviews

Clay Mineralogy

2nd Edition, by R. E. Grim
McGraw-Hill International Series in
the Earth and Planetary Sciences,
1968, 596 pp., U.S. $ 18.50

Clay materials have been important to mankind from at least as far back in antiquity as the earliest agricultural communities. Archaeological sites show abundant evidence of the use of shaped and baked clay vessels of various kinds. Other uses developed later and today naturally-occurring clays, sometimes modified by sophisticated treatments, touch upon our lives in very many ways.

The 19th and early 20th centuries saw an increasing amount of research effort expended on the study of clays, particularly soil-clays, but it was not till as recently as the late 1920's that really significant progress was made in their scientific understanding. Prior to the application of X-ray diffraction at that time, their crystalline nature was not recognized and the techniques of chemical analysis and microscopic examination used were quite inadequate to explain the very different chemical and physical properties shown by different clays. The infant science developed rapidly and its growth during the intervening 40 years has been materially aided by the wide range of new techniques in addition to X-ray diffraction which have become available and are now applied to its study. During most of those years Professor Grim has been, perhaps more than any other individual, the central figure in the field and has roamed widely across it in his own researches. From his research school at the University of Illinois have come generations of students many of whom now occupy key positions in industry and academia and have made an impressive *in toto* contribution to clay mineralogy.

Since 1953, Grim's *Clay Mineralogy* has been *the* standard text, the first to which anyone working in the field would turn for guidance and the only one attempting to cover all aspects of the subject. In a rapidly developing subject the need for a Second Edition has been a pressing one for some time, and it is not surprising that the new edition turns out to be substantially larger than the original. The arrangement of material in the new edition is essentially as in the first and covers the structures, chemical and physical properties, origin and occurrence of the clay minerals. Properties such as refractoriness, plasticity and so on are not included since these are treated in the companion volume *Applied Clay Mineralogy* published in 1962.

The book starts with a consideration of what a clay mineral is and moves on to problems of classification and nomenclature, subjects which are currently under review by a Committee set up by AIPEA. The crystal structures of the various minerals are now well understood and are dealt with in some detail. This leads logically to a consideration of the X-ray diffraction effects produced by the minerals and a useful discussion of points of confusion likely to be met with in practice. A considerable amount of detail is provided on the morphology of the minerals and illustrated by an impressive series of transmission and replica electron micrographs. Ion exchange is given an extensive and very adequate coverage as befits its importance. However, the very high value listed for hydrated halloysite in the table of cation exchange capacities is based on early work and has since been seriously questioned. Furthermore, the ranges and particularly the large overlap of the values for the smectite and vermiculite groups would not be acceptable to many workers in the field.

The subsequent sections on hydration, dehydration and recrystallization at elevated temperatures are areas to which the author himself and his colleagues have contributed heavily, and the same applies to interlayer clay-organic systems. The use of the complexes for identification of the minerals, for the study of their properties and for the determination of the geometry of the organics themselves are considered in turn. In a separate section the intercalation (or intersalation) of salts in kaolinites is also discussed. Other sections deal with optical methods, the infra-red spectra, solubility in acids and alkalies, surface area determinations, etc. etc.

Unlike other sections of the book, that on clay-water systems deals with an area in which speculation and polemic reign. The author favours the concept of ordered or "quazi-crystalline" water in the vicinity of clay mineral surfaces while admitting that others find the evidence unconvincing and insufficient on which to base firm conclusions. Unfortunately an important 1964 review of the subject has been overlooked in considering this issue.

The two final chapters deal with the origin and occurrence of the clay minerals, their synthesis, their formation under natural hydrothermal conditions, under normal soil weathering processes, and in marine and other aqueous environments. This is another area to which the author and his colleagues have made large contributions and the treatment is comprehensive.

Throughout the treatise a sufficient number of references are given to allow students to follow up areas of specific interest to them. A list of "Additional References" at the end of each chapter is a useful feature. The subject index is adequate for its purpose but the addition of an author index would have been helpful. Among the very large number of chemical analyses of clays which have been published, the monomineralic nature of the material is often suspect; an appendix containing selected analyses of materials of well-defined mineralogy has therefore been added. The book is of course an indispensable mine of information not only for students and workers in the field of clay mineralogy but also for geologists, ceramists, engineers and others who come into contact with clay minerals in the course of their professional lives.

G. F. Walker
Division of Applied Mineralogy
C S I R O, Melbourne, Australia

Mokady Memorial Issue

Israel Journal of Chemistry. Vol. 6.
Guest Editors: Lisa Heller and Amos Banin.
Pp. 155–420. (Weizmann Science Press,
Jerusalem, Israel. 1968).

The Mokady Memorial Symposium was sponsored by The Israel Society of Soil Science and The Israel Society of Clay Research, to honour Dr. Raphael S. Mokady, who fell in the Six Day War. Different soil scientists from various parts of the world, most of them Mokady's personal friends, were invited to give lectures. This book contains all the lectures given during the symposium. In addition to 24 articles and 3 notes, there are a vita and a list of publications of Dr. Mokady. The articles concern several different aspects of soil science.

The articles and notes fell into the following categories:

The salinity of agricultural soils and the movement of salt in soils are two fields intensively studied today. Several papers (1, 2, 5, 16, 22, 24, 25 and 26) are more or less connected with these problems.

Another field of general interest is ionic exchange. 4 articles are directly related to this field (3, 4, 6 and 10).

Interaction between organic molecules and clay minerals is studied in 3 articles (13, 14 and 15).

It has generally been accepted that control of particle size is desirable in many types of soil – ion – water experiments.

An optical method for determining particle size is reported (8) and the influence of exchangeable ions upon particle size and some mechanical properties are presented (8, 9 and 12).

The properties of water in soils is currently attracting much interest from experimenters and theoreticians, partly because the subject is of great importance to many aspects of soil science. In this book 5 articles (5, 16, 17, 18 and 19) are related to this subject.

There is no doubt that we are learning more and more about the soil – ion – water system, but the time when all the pieces of information can be woven into a comprehensive whole is still a long way off.

In brief, an excellent book and unreservedly recommended to soil scientists.

1. R. S. Mokady, Israela Ravina and D. Zaslavsky:
   Movement of salt in saturated soil columns.
2. R. S. Mokady and A. Majdan:
   A new method for measurement of the electrical conductivity of unsaturated soils.
3. G. H. Bolt and C. J. G. Winkelmolen:
   Calculation of the standard free energy of cation exchange in clay systems.
4. D. H. Yaalon and Hanna Koyumdjisky:
   Displacing exchangeable potassium in cation exchange determinations.
5. A. Cremers:
   Surface conductivity in sodium clays.
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Institute of Geology
University of Oslo, Norway

New Publications

Mineralogy in Soil Science and Engineering

Soil Science Society of America,
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1968, Madison, Wisconsin, U.S.A.

Content:

Phillip F. Low: Mineralogical Data Requirements in Soil Physical Investigations.

Hans F. Winterkorn: Engineering Applications of Soil Mineralogy.

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W. F. Bradley: Trends in Mineralogical Analyses.

Genesis of the Kaolin Deposits

Proceedings of Symposium I,
Vol. 14 in Report of the Twenty-Third Session of the International Geological Congress, Czechoslovakia, 1968.

Contents:

R. E. Grim & F. M. Wahl: The kaolin deposits of Georgia and South Carolina, U.S.A.

F. May & J. Phemister: Kaolin deposits in the Shetland Islands, U.K.

J. Neuzil & M. Kuzvart: Petrography of kaolins from Ghana.

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R. A. Healing & P. C. Wright: International aspects of kaolin.

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Geologica, 1968, No. 1–2.
Charles University, Prague,
174 pages. Cz-Sl. crowns 20.–.

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M. Kuzvart & J. Konta: Kaolin and laterite weathering crusts in Europe.

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W. D. Keller: Flint clay and a flint clay facies.

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National Committee of Geologists of the USSR, Academy of Sciences of the USSR, Moscow, 1968, Publishing House »Nauka«. (In Russian, summaries in English).

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