

## Article

# The Clay Minerals Group (CMG): 1947–2022

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### Abstract

The Clay Minerals Group (CMG), the first of the Special Interest Groups of the Mineralogical Society of the UK and Ireland, was inaugurated in January 1947. The CMG, together with its Belgian equivalent (originally the Comité Belge pour l'Etude des Argiles, later the Belgian Clay Group, now defunct), formed the world's first organizations dedicated to clay mineral research. The CMG celebrated its 75th anniversary in 2022. The Group's aims are to stimulate interest in clay mineralogy, to facilitate an exchange of information between members by providing facilities for reading and discussing papers on research on clay minerals (and allied topics) and to expedite their publication and to encourage practical applications of such research, and these have remained reassuringly the same throughout its history. A founder and active member of both the European Clay Groups Association and the Association Internationale Pour L'Etude des Argiles, the CMG has promoted clay science through the publication of the highly regarded journal *Clay Minerals* and a series of influential book titles, organizing international and national scientific conferences and meetings, the George Brown Lecture series, providing bursaries and grants to assist researchers and hosting the Images of Clay archive. The initial and sustained success of the CMG has been largely due to the labours of many officers and committee members, some of whom have been recognized for their science and service with awards from the Mineralogical Society of the UK and Ireland and elsewhere. By maintaining this effort, the evident, continuing demand for clay mineral research to assist with changing societal needs should ensure the relevance and health of the CMG for the foreseeable future.

**Keywords:** Clay Minerals Group, *Clay Minerals* journal, George Brown Lecture, Images of Clay, Mineralogical Society

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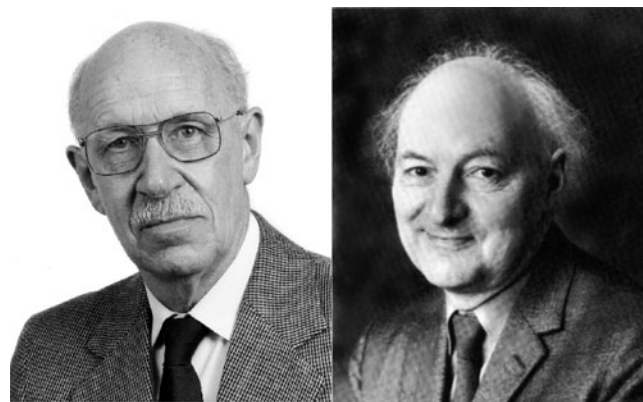
The Clay Minerals Group (CMG), the first Special Interest Group (SIG) of the Mineralogical Society of the UK and Ireland, was formed in 1947 and celebrated its 75th anniversary in 2022. The following account was presented as part of the 75th Jubilee meeting held at the Natural History Museum, London, on 25–26 May 2022. An excellent but unpublished commentary prepared for the Golden Jubilee (Bain, 1997) together with the reflections of Douglas M.C. MacEwan (1999) provided valuable resources for the origin and first 50 years of the CMG story, which has been expanded and detailed below.

### Inauguration

Soon after the end of World War II, discussions between Robert C. Mackenzie and Douglas M.C. MacEwan (Fig. 1; both of the Macaulay Institute for Soil Research) initiated thoughts of the formation of a SIG for researchers interested in clay minerals. A new independent society was considered impracticable and so, in 1946, negotiations proceeded with the officers of the Mineralogical Society of Great Britain and Ireland (MinSoc).<sup>1</sup> Indeed, the formation of the MinSoc had come about largely following

correspondence between Joseph Henry Collins (1841–1916), a mining engineer in Cornwall concerned with the China clay industry, and several other mineralogists (Campbell-Smith, 1976). Clay mineralogy was therefore regarded sympathetically from the start, and Collins, as the first Editor of *Mineralogical Magazine*, published clay mineralogical papers in the first issue (Robertson, 1989).

Mackenzie and MacEwan felt that clay minerals were so different in nature from the macroscopic minerals and that the



**Figure 1.** Robert Mackenzie (left) and Douglas MacEwan (right): 'founders' of the CMG.

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<sup>1</sup>From 10 November 2021, known as the Mineralogical Society of the UK and Ireland.

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techniques of their investigation were so different that a separate group of the MinSoc should be formed to encourage research on these minerals, to allow for the presentation of papers and to publish the results of research. Initially, the MinSoc were reticent to agree to the plan, as it was feared that other special interests would also claim the right to form groups (gemmology, lead-zinc ores, *etc.*), disadvantaging the Society. (Paradoxically, it is now widely acknowledged that the formation and activities of the MinSoc SIGs form the backbone that supports the Society). Undeterred, Mackenzie and MacEwan were fortunate to obtain the necessary sponsorship of Professor John D. Bernal FRS, a pioneer of X-ray crystallography in molecular biology, then of Birkbeck College, University of London (Hodgkin, 1980).

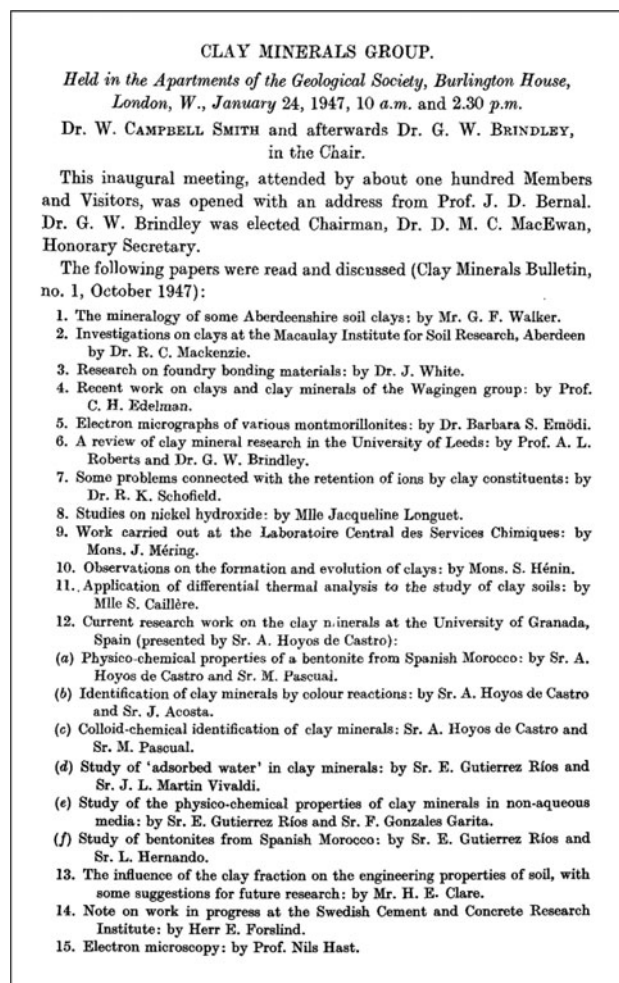
The first CMG meeting was held in the offices of the Geological Society of London, Burlington House, Piccadilly, London, on 24 January 1947. Approximately 100 members and visitors (some from overseas) listened to an opening address by Bernal and 15 further scientific papers, many of which were reviews of clay mineral research in various European countries (Fig. 2; Nature, 1947). The meeting then proceeded to the first Annual General Meeting (AGM) where a draft constitution was agreed and George W. Brindley (University of Leeds) and MacEwan (now at Rothamsted Experimental Station) were elected the first Chair and first Honorary Secretary (also Treasurer and Editor), respectively. The main objectives of the CMG were established to: (1) stimulate an interest in clay mineralogy; (2) facilitate an exchange of information between members with interests in clay minerals by providing facilities for reading and discussing papers on research on clay minerals (and allied topics); (3) expedite paper publication; and (4) encourage practical applications of such research. Reassuringly, these aims remain the same to the present day. Membership of the CMG was restricted to MinSoc members but was available purely on request with no additional subscription. The arrangement, confusing for some and certainly an impediment to ascertaining precise CMG membership, also remains in place to the present. Initially, the MinSoc Council limited CMG expenditure to £5/meeting and a total of £20 annually. Within a few years, however, the CMG was running its own accounts and receiving funds from subscriptions to the *Bulletin* (see below). A Foreign Delegates fund was set up, largely from donations, to help defray the expenses of invited speakers and guests from abroad.

A more detailed account of the origin of the CMG was recorded and presented at the Golden (50th) Jubilee Meeting held at The Macaulay Land Use Research Institute, Aberdeen, on 10 April 1997 and later transcribed and published (MacEwan, 1999).

## Officers

The first CMG Chair, Brindley (Fig. 3), served for just over 2 years before being succeeded by Arthur L. Roberts, also working at the University of Leeds, in April 1949. At the same time, MacEwan was also succeeded as Honorary Secretary by Mackenzie. MacEwan was very self-critical about his time as Honorary Secretary, suggesting that he was 'bad at keeping records and lax in replying to correspondence'. However, he continued the job of editing the periodical as Honorary Editor, this post-holder then becoming an *ex officio* member of the committee.

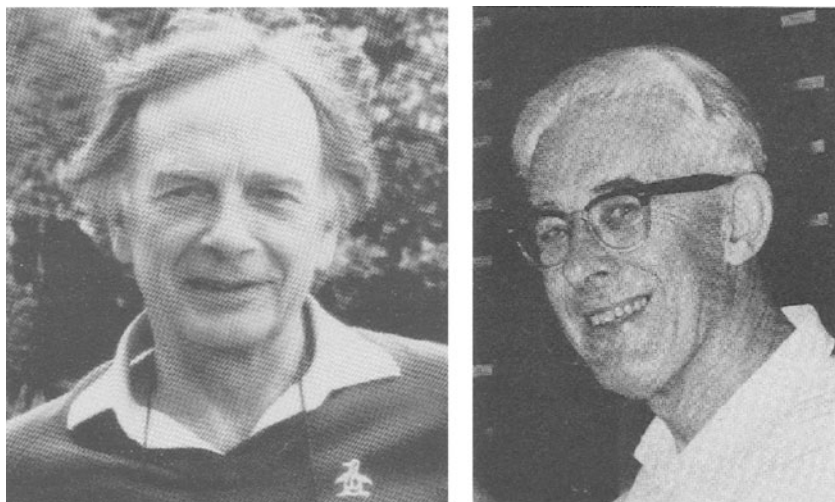
In 1953, the Treasurer's role was separated from that of the Honorary Secretary, and this new post was filled by George Brown (Fig. 3). The executive committee then comprised the



**Figure 2.** Programme for first meeting of the CMG (taken from the *Proceedings of the Mineralogical Society*, 1947).

four officers (Chair, Honorary Secretary, Honorary Editor, Treasurer) together with six ordinary members of the Group (and the immediate Past-Chair and the Secretary of the MinSoc). In 1970, a common constitution was promulgated for all the MinSoc SIGs, based on the CMG model, and incorporated in the Byelaws for the MinSoc. Up until 1969, Chairs served 2 year terms, but subsequently this changed to 3 years. Exceptionally, John M. Adams served as Chair for 4 years (2010–2014). Before 1970, Secretaries and Treasurers served rather erratic terms of office, ranging from 2 to 11 years. Under the constitution, these posts were specified as 6 year terms, although this has not always been realized. Honorary Editors, known as Principal Editors from 1976, initially served 5 year terms, but these have extended in more recent times, notably with Derek C. Bain (1987–2001), Adams (2001–2013) and the present incumbent, George E. Christidis (2013–). A full listing of all CMG officers (Chairs, Secretaries, Treasurers and Editors) and their election dates is shown in Table 1.

The CMG could not, of course, have survived without the unstinting hard work and devotion of a long line of dedicated individuals, helped, at least tacitly if not enthusiastically, by their employers, both public and private. While the burden of administration and publication matters has fallen predominantly on the Honorary Secretary and the Editor of *Clay Minerals*, other



**Figure 3.** Renowned members of the CMG. George Brown (top left, Chair, Treasurer, lecture series), George Brindley (top right, first Chair) and V. Colin Farmer (bottom, Distinguished Member).

committee members have frequently made major contributions, especially in organizing meetings and in arranging their scientific content. Among the most supportive departments mention should be made of Rothamsted Experimental Station, the Macaulay Institute for Soil Research (later the Macaulay Land Use Research Institute and now the James Hutton Institute), the Institute of Geological Sciences (later the British Geological Survey; BGS), the Building Research Station and the British Ceramic Research Association. Of these, the James Hutton Institute and the BGS continue to form cornerstones of the CMG. A number of university departments should also be included, especially those concerned with agriculture/soils, geology/mineralogy, ceramics and physics. These have been associated, in particular, with the Universities of Leeds, Cambridge, Sheffield, London, Reading and Southampton. Over the 75 years of the CMG, clay research in several of these departments has declined or closed as research and teaching priorities have altered. However, the CMG has welcomed additional support from the chemistry/earth science/engineering faculties of the Universities of Durham, Manchester and Newcastle.

In the early days, the CMG received major support from the clay mining and processing companies, particularly English China Clays, Watts, Blake and Bearne, Fuller's Earth Union (Laporte), The London Brick Company and F. W. Berk & Co. Later, particularly in the 1980s and 1990s, the CMG benefitted

from funding from several petroleum companies. While these areas of support have declined more recently, the CMG continues to maintain useful industrial links with Imerys Minerals, Ltd, Sibelco and BYK Additives, Ltd.

As discussed previously, due to the requirement for MinSoc membership but with there being no specific CMG registration, establishing the precise membership of the Group has always proved problematic. However, in 1976, membership stood at 340, half of whom resided overseas (Robertson, 1989). In 1997, CMG membership was determined to be 384, of whom 198 were UK resident and 186 resided overseas. Since 2018, and based on a best-endeavours estimate, the CMG has paid Association Internationale pour l'Etude des Argiles (AIPEA) subscriptions to cover for 125 members.

### The journal

Publication and distribution of papers has been a major strand of CMG activity (Fig. 4). In the beginning, abstracts and proceedings of papers were cyclostyled and circulated as two issues of a periodical, the *Clay Minerals Bulletin*, in October 1947 and August 1948. Issue no. 1 included summaries of the papers presented at the inaugural meeting, including Professor Bernal's opening address. However, the CMG committee quickly realized the importance of this means of communication and subsequently

**Table 1.** Officers of the CMG.

Chairs	Honorary Secretaries	Honorary Treasurers	Honorary Editors <sup>a</sup>
1947, G.W. Brindley	1947, D.M.C. MacEwan		1949, D.M.C. MacEwan
1949, A.L. Roberts	1949, R.C. Mackenzie		
1951, G. Nagelschmidt			
1953, R.H.S. Robertson		1953, G. Brown	
1955, J.H. Taylor	1956, R.M.S. Perrin		1954, R.J.W. McLaughlin
1957, A.F. Hallimond			
1959, J. White			1959, R.C. Mackenzie
1961, H.P. Rooksby			
1963, R.W.B. Nurse	1964, I.L. Freeman	1964, A.H. Weir	1964, R.G. Greene-Kelly
1965, D.A. Holdridge			1966, W.A. Mitchell
1967, B.S. Neumann	1968, A.H. Weir	1969, A.W. Flegmann	1969, R.K. Harrison
1969, G. Brown			
1972, R.C. Mackenzie	1972, J.A. Bain		1972, J.L.M. Lambert
1975, D. Mitchell		1975, I.R. Basham	
1978, A.H. Weir	1978, M.J. Wilson	1979, D.C. Bain	1979, D.J. Morgan
1980, J.A. Bain			
1983, C.V. Jeans	1984, D.C. Bain	1984, P.J. Loveland	
1986, M.J. Wilson	1987, P.L. Hall	1988, T.J. Primmer	1987, D.C. Bain
1989, D.J. Morgan			
1992, H.F. Shaw	1992, I.R. Wilson	1993, J.M. Adams	
1995, A. Parker			
1998, R.J. Merriman	1998, S. Hillier	1998, N.J. Elton	
2001, D.C. Bain			2001, J.M. Adams
2004, C. Breen	2004, D.S. Wray	2004, D.R. Brown	
2007, S. Hillier			
2010, J.M. Adams	2010, S.J. Kemp	2010, D.S. Wray	
2014, H.C. Greenwell			
2017, S.J. Kemp	2017, H. Pendlowski	2016, F. Clegg	2013, G. Christidis
2020, A. Neumann			

<sup>a</sup>Principal Editors from 1976.



**Figure 4.** Example *Clay Minerals* journal front pages through the years.

reprinted issue nos. 1 and 2 in a combined issue of 72 pages in 1948, with the initial Editorial signed by both MacEwan and Brindley. For formal printing as a typeset journal in 1949, a compact, *statement* 8.5" × 5.5" page size, green covers and volume numbering (still in use) were adopted. Although English was the preferred language for papers, French or German were also considered. Such a policy was greatly aided by MacEwan's strong interest in language and relied on his translations to put summaries and sometimes complete papers into the *Bulletin*. From the beginning, the journal contents were international, but the first number to publish extensively in foreign languages was that devoted to the proceedings of the International Clay Minerals Congress in Paris in 1954 – no. 12 of volume 2, which was the last number to be edited by MacEwan.

By issue no. 7, sales were opened to all for the price of 6 shillings/copy. Issues 1–30 were printed by A. Walker & Son, Ltd, Galashiels, Scotland, while distribution and storage were handled independently. Some reprinting of out-of-print issues was undertaken to maintain a complete run of back numbers. The CMG was very grateful to English China Clays, St Austell, who took a full-page advertisement in every issue, and regular advertiser Rayner's of London for bringing much-needed revenue to support the *Bulletin*.

In July 1964 (issue no. 31 in the middle of volume 5), both publication and distribution of the journal were transferred to Blackwell Scientific Publications, Osney Mead, Oxford, to 'gain from their experience in producing and handling scientific communications'. (The MinSoc resumed publication from 1981.) At the same time, the journal title was changed to *Clay Minerals*, the international serial number ISSN0009-8558 was acquired, a larger metric *quarto* (215 × 275 mm) format was adopted and publication was standardized at two issues per year (Fig. 4). The scope of the journal was also increased to include notes for topics that did not merit the scale of a full paper, book reviews and obituaries. The journal was then issued to all MinSoc members, with the CMG receiving £1.50 per head from the Society's annual subscription towards the cost of publication.

A major step in the development of the journal was taken in 1976 when, following agreement at a joint meeting of representatives from the West European Clay Groups in Strasbourg in March 1974, *Clay Minerals* was adopted as the common journal of the European Groups (Fig. 4). Publication of other European Group periodicals ceased, with these submissions being diverted to *Clay Minerals*, necessitating an increase in publication frequency to four issues per year (Morgan, 2001). Submissions were accepted in one of four languages (English, French, German and Spanish) with 'Instructions for Authors' being printed in each of these languages on the inside back covers of consecutive issues. However, authors were encouraged to submit papers in English. Initially, it was intended to include abstracts which had up to 150 word in all four languages for each paper.

These laudable aims quickly placed a huge additional burden on the editor(s) not only to ensure that the English text was written to an acceptable reading standard, but also to obtain abstract translations where these had not been provided. Therefore, in 1984, some of these aims were revoked and, from this point, papers carried an English-only abstract, except where the paper was non-English, for which an additional abstract was appended. Operation, management and copyright issues were all handled by the MinSoc staff to achieve continuity. The CMG was responsible for appointing the Principal Editor, who was aided by two or three Associate Editors and an Editorial Board drawn from the

membership of the participating European Groups. Ahead of its time, *Clay Minerals* implemented measures to ensure uniformity in reviewing standards and to prevent discrimination against or bias in favour of any one Group.

Journal subscriptions were handled by the MinSoc office, and at this time the significant decision was taken to allow members to pick and choose which journals (*Clay Minerals* and the MinSoc's other titles: *Mineralogical Magazine* and *Mineralogical Abstracts*) to receive when renewing their membership. This decision saw the distribution of and revenue from *Clay Minerals* reduce dramatically from 932 to 211 UK members, with the addition of a number who received free copies as life members. There was little superficial change to the appearance of the journal other than the introduction of a colour-coded band on the plain cover to distinguish one year's issues from another from 1976 (Fig. 4).

In 1982, journal publication was brought in-house and a contract for typesetting and printing awarded to Spottiswoode Ballantyne, Colchester, Essex. An innovation at that time, but now standard practice, was the journal's inclusion of an annual list of paper reviewers to show appreciation for their time and efforts to improve submissions.

Issues devoted to specific topics or covering the proceedings of thematic meetings were introduced to improve the scientific and technical attraction of the journal and to increase overall circulation, particularly for the industrial sector. So as not to disadvantage the normal acceptance of papers, the CMG sought additional revenue or sponsorship for special issues to provide for extra pages, additional issues and the inclusion of colour plates. Volumes 19, 21 and 29 were therefore extended to a total of five issues each instead of the usual four. Five of these special issues were devoted to the proceedings of the CMG hydrocarbon-related conferences in Cambridge (1983, 1985, 1988, 1993 and 1998). Christopher V. Jeans deserves great credit for organizing these meetings and raising the considerable funds required for the publication of the proceedings. Two were thick publications, with volume 21(4) consisting of almost 400 pages (covering 21 papers) and volume 24(2) consisting of ~330 pages (covering 17 papers). Extended print runs enabled these special issues to be offered as individually available monographs and considerably enhanced the reputation of the journal. Three other special issues were devoted to papers presented at a CMG meeting in Aberystwyth in 1983 (on the theme of 'Recent developments in clay mineral applications'), the Sixth Joint Meeting of the European Clay Groups in Seville in 1987 and the Eighth Meeting of the European Clay Groups in Leuven in 1995.

In 1991, a front-cover image was introduced for the first time to enhance the journal's presentation. This was a monochrome photomicrograph and was changed annually (Fig. 4). Contracts for typesetting and printing, respectively, were awarded to Westfield Typesetting, North Walsham, Norfolk, and Black Bear Press, Ltd, Cambridge, in 1995.

Following the CMG's introduction of the George Brown Lecture Series in 2006 (see below), the journal published a paper based on Alain Plançon's inaugural address. This was followed subsequently by a further 21 lectures and their associated papers to the present day. Each George Brown Lecture paper is published open access, thus being offered free of charge for all to read.

In 2002, the front-cover design of volume 37(1) of the journal was changed again to a blue design with a foreground sketch representing a hexagonal tetrahedral sheet with a scanning electron image of flake-like, clay mineral crystals as a background

(Fig. 4). From this point onwards, the journal title was changed to *Clay Minerals – Journal of Fine Particle Science* and the previous subtitle *Journal of the European Clay Groups* removed.

The first issue of 2006 was a large, 550 page volume devoted to the onshore and offshore clay mineralogy of the British Isles, edited by Jeans and Richard J. Merriman (see below). From 2007 onwards, the number of Associate Editors was gradually increased to nine, with a change of emphasis. The new Associate Editors were selected to provide expertise in different scientific topic areas rather than, as previously, to represent different geographical/language areas or national clay groups.

During the 2000s, the journal stepped up the publication of special issues devoted to papers presented at various international conferences, including a thematic set of papers presented at Euroclay (Aveiro, Portugal) in 2008 and another dedicated to natural zeolites following the International Natural Zeolite Association (INZA) conference in 2011. This tradition continued with special issues for the Dresden Mid-European Clay Conference, the Belgrade INZA (both published in 2015) and the Edinburgh Euroclay conferences (published in 2016–2018). Previously, the last special issue devoted to the CMG Cambridge Conferences had been published in 2014. In addition, two special issues related to radioactive waste disposal, including papers presented at topical conferences, were published in 2016 and 2018.

From 2016, the journal entered a ‘new era’, including the electronic submission and handling of manuscripts, the further involvement of European Clay Groups Association (ECGA) members and the significant publication move (along with the only other MinSoc journal, *Mineralogical Magazine*) to Cambridge University Press. In 2019, the page format of the journal increased from its *quarto* size, introduced in 1964, to A4 (Fig. 4). The coloured reproduction of figures was also provided free of charge. At the same time, the Editorial Board structure of the journal changed, with Editorial Board members becoming Associate Editors with the additional responsibility of handling the submitted manuscripts. In 2022, the journal added a second Principal Editor, Professor Chun Hui Zhou (Zhejiang University of Technology, China), in an effort to increase its readership profile in the East Asia and Pacific regions.

In recognition of their busy schedules and, subsequently, the need to maintain close contact with members of the ECGA, the Editor was able to call on an Editor’s Travelling Fund and, latterly, the journal’s account itself to help defray the travelling expenses and related costs incurred in pursuing their duties.

The circulation of *Clay Minerals* at the end of 1997 comprised 446 library and institutional subscriptions, with members of the CMG taking 295 copies and members of the other European Groups taking 205 copies. These figures probably represented the zenith for *Clay Minerals*’ institutional subscriptions, as content became increasingly accessible online using journal platforms such as GeoScienceWorld (GSW), De Gruyter and, later, Cambridge Core. By 2017, the hardcopy journal was taken by just 76 institutions. Although it is still possible to pay for a print copy of the journal, the final hardcopy volume was produced in December 2022. MinSoc membership now includes complementary access to the online versions of both *Clay Minerals* and *Mineralogical Magazine*. The full journal archive is now available through Cambridge University Press. All content from 2000 onwards is also available from GSW. The older archive (1947–1999) is no longer available free of charge to all.

The journal impact factor, based on the number of times papers are cited, is (rightly or wrongly) the most-used indicator

for assessing scientific journals. These are calculated annually and reported in the Journal Citation Reports published by Clarivate Analytics. Data for *Clay Minerals* from the period 1997–present compared to the other leading clay mineral journals are displayed in Fig. 5.

## Books

Alongside the journal, the CMG has a long history of producing books and monographs, mostly published by the MinSoc (Table 2).

### Technique monographs

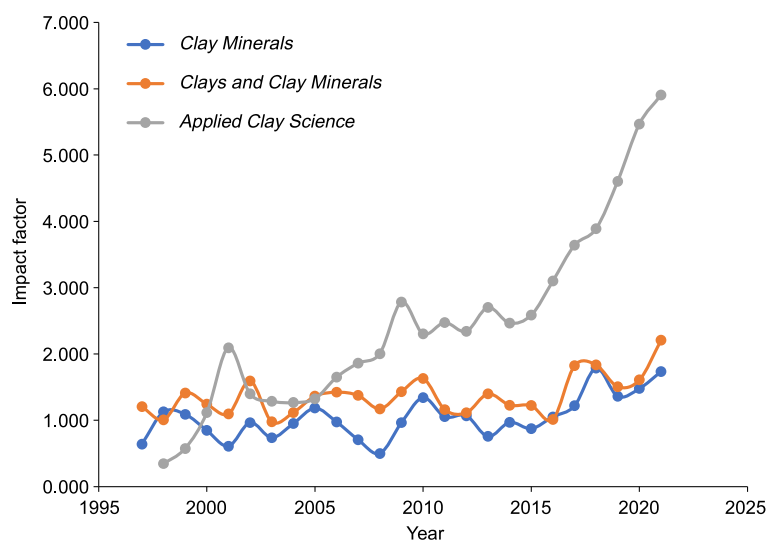
A series of monographs on mineralogical techniques has long been held in considerable esteem by the scientific community, and the individual titles have become essential textbooks and reference manuals for clay research. The first in the series, Monograph No. 1, *The X-ray Identification and Crystal Structures of Clay Minerals*, was initiated and edited by Brindley, then Chair of the CMG. It was produced in a remarkably short time and published in 1951. Rapid advances in knowledge justified a revision of the text, and a second edition, edited by Brown, was issued in 1961. Later in 1980, a completely rewritten monograph (No. 5), edited by both Brindley and Brown, was published. This version separated the mineral structure chapters from the techniques of X-ray investigation and so was launched with the slightly amended title: *Crystal Structures of Clay Minerals and their X-ray Identification*. The relaunch was so well received that further reprinting was required in 1985 (Morgan, 2001). The monograph proved to be a seminal publication that changed the focus of clay mineral research by providing sound guidance on the techniques for identifying clay minerals (Güven, 1982). This in turn changed the challenge of clay research from ‘what is it?’ to ‘how did it form and in what environment?’.

In 1957, Monograph No. 2, *The Differential Thermal Investigation of Clays*, edited by Mackenzie, was published. This volume provided an essential guide to this relatively new technique for studying clays and usefully also included much information on the behaviour of associated non-clay species. Once again, the monograph succeeded because it offered information on the interpretation of results, something that was particularly scarce at this time (Nature, 1958).

After a long gestation period, a companion volume, *The Electron-Optical Investigation of Clays*, edited by John A. Gard, was published as Monograph No. 3 in 1971. Readers particularly appreciated the high-quality reproduction of the many photomicrograph plates, an essential requirement for a book dealing with the morphology of mineral species most encountered in particle sizes of only a few microns (Mortland, 1972). Perhaps disappointingly, the monograph omitted chapters covering the increasingly popular scanning electron microscopy and microanalysis using the electron microprobe.

Monograph No. 4, *The Infrared Spectra of Minerals*, edited by V. Colin Farmer (Fig. 3), was published in 1974. The monograph first described the theoretical and practical aspects of infrared and Raman spectra to mineralogical investigations before describing, explaining and illustrating the spectra obtained from mineral species, including the layer silicates. The volume also covered the application of the technique to the study of cements, ceramics and glasses (Whittaker, 1975).

For many years, the CMG tried to arrange the publication of a further volume on the chemical composition of clay minerals. The



**Figure 5.** Impact factors for *Clay Minerals* and other clay mineralogy journals, 1997–present. Note that the Japanese *Clay Science* journal is excluded due to a lack of data. Data from Journal Citation Reports (Web of Science), provided by Clarivate. Journal Citation Reports, Web of Science and Clarivate are trademarks of their respective owners and used herein with permission.

CMG approached José J. Fripiat (Leuven, Belgium), who prepared an outline synopsis and sought contributors for the various chapters. Although the contributors were willing, the CMG became increasingly dissatisfied with Fripiat's performance and he was excused from the role and replaced by Alan C.D. Newman (Rothamsted Experimental Station). Lengthy negotiations then ensued to extract the project-generated material involving, apocryphally, a large package, a courier and a handover at one of the cross-channel ports! Under Newman's leadership, work on the book finally started to accelerate, even though by this time two of the originally nominated contributors had passed away. The volume was finally published as Monograph No. 6, *Chemistry of Clays and Clay Minerals*, in 1987. Along with the chemical composition of clay minerals and associated mineral species, the opportunity was taken to include chapters on clay colloid behaviour, surface chemistry and reactions to heat and organic substances (McBride, 1988).

The MinSoc guaranteed the necessary finance to publish all but one (No. 6) of these monographs, aided by Royal Society loans to underwrite the initial costs. However, by the early 1970s, the CMG's finances were in such good health that it was able to make a couple of substantial loans to the parent MinSoc towards the cost of printing monographs. Following the experience of contracting out the Proceedings Volume of the Oxford International Clay Conference (ICC; see below), the publication of the *Chemistry of Clays and Clay Minerals* title was undertaken

by the Longman Group, under their name but vesting the copyright in the Society, retaining the format of the series and assigning a percentage of the income from sales to the CMG.

Over the years, various suggestions have been made for further titles in the monograph series, but for various reasons these have not come to fruition.

### Others

In addition to the technique monograph series, the CMG have also published other titles, generally on the clay mineralogy of British sediments and sedimentary rocks.

The first title published in 1954, *A Glossary of Clay Trade Names*, was initiated by Robert H.S. Robertson and, after further augmentation, was recommended for issue as a CMG publication.

During the 1960s, Robert M.S. Perrin collated the results of clay mineral analyses of British argillaceous rocks from an extensive range of UK and international papers, research reports and private files from 1947 onwards. The clay and non-clay data were used to populate a series of geographically and stratigraphically arranged tables and included lithology, locality, grid reference, preparation and analysis methodology, laboratory and analytical date. The details of each of the clay mineral groups provided a brief but succinct account of the origin and diagenesis of clay minerals in sedimentary rocks. Usefully, the book also included the results of a study where four identical whole-rock samples

**Table 2.** Listing of CMG books and occasional papers.

Monograph no.	Publication year	Title	Authors/editors	ASIN/ISBN-13/ISSN
1	1951 (1961)	<i>The X-ray Identification and Crystal Structures of Clay Minerals</i> (2nd edition)	G.W. Brindley	B0000CLCQJ
–	1954	<i>Glossary of Clay Trade Names</i>	R.H.S. Robertson	9021416
2	1957	<i>The Differential Thermal Investigation of Clays</i>	R.C. Mackenzie	978-0903056038
3	1971	<i>The Electron-Optical Investigation of Clays</i>	J.A. Gard	978-0903056014
–	1971	<i>The Clay Mineralogy of British Sediments</i>	R.M.S. Perrin	978-0903056007
4	1974	<i>The Infrared Spectra of Minerals</i>	V.C. Farmer	978-0903056052
5	1980	<i>Crystal Structures of Clay Minerals and their X-ray Identification</i>	G.W. Brindley and G. Brown	978-0903056083
–	1986	<i>Fuller's Earth: A History of Calcium Montmorillonite</i>	R.H.S. Robertson	978-0856060700
6	1987	<i>Chemistry of Clays and Clay Minerals</i>	A.C.D. Newman	978-0582301146
–	1989	<i>History of Clay Research in Great Britain</i>	R.H.S. Robertson	B0007C9WSW
–	2006	<i>Clay Minerals in Onshore and Offshore Strata of the British Isles: Origins and Clay Mineral Stratigraphy</i>	C.V. Jeans and R.J. Merriman	0009-8558

and two preparations were submitted to seven different laboratories for analysis – a round-robin forerunner to the Clay Minerals Society's (CMS) Reynolds Cup competition. The book, *The Clay Mineralogy of British Sediments*, was published in 1971 under the auspices of the MinSoc and appeared in a thick, pocket-sized, paperback format (Prentice, 1971).

Following much interest in an invited talk at the Centenary Celebrations of the MinSoc, Robertson produced a discursive compilation on the development of clay research in the UK (*History of Clay Research in Great Britain*), which was printed as an Occasional Paper of the CMG (Robertson, 1989). Of necessity, this contained some details of the development of the CMG itself. Robertson also compiled a further volume: *Fuller's Earth: A History of Calcium Montmorillonite*, which was printed independently and issued under the auspices of the MinSoc, also as an Occasional Paper (Highley, 1986). The MinSoc Publications Committee initially rejected the manuscript, mainly due to the possible expense of typesetting, as the format required extensive notes in marginalia. However, Robertson arranged the typesetting with MacEwan, who had left clay mineral research (and the CMG) to run a publishing company (Volturna Press).

A relatively long hiatus then ensued before the CMG's next book: *Clay Minerals in Onshore and Offshore Strata of the British Isles: Origins and Clay Mineral Stratigraphy*, which was published in 2006 and edited by Jeans and Merriman. This data-packed, 550 page tome provided a long-awaited successor to Perrin's 1971 compilation *The Clay Mineralogy of British Sediments*. Successive CMG Chairs were determined to see it published during their term of office, but this aspiration did not consider the difficulties of holding contributors (actual and potential) to submission deadlines! Its final appearance was due in very large part to the industry and persistence of Jeans, who led from the front in contributing three weighty chapters. Twelve contributors produced much more detailed and interpretative accounts in their 10 chapters, arranged in reverse stratigraphical order. Much use was made of data from UK hydrocarbon exploration activities that reached their height in the 1980s and 1990s, augmented by academic research studies and government-funded strategic surveys. The volume was based solidly on many tens of thousands of X-ray diffraction analyses, but it was also illustrated beautifully with colour and monochrome optical, scanning electron and transmission electron micrographs. Unusually, the volume was published as both a standalone hardback book and also, to satisfy the authors' demands for citations, as a series of papers in *Clay Minerals* (volume 41, 1–550). Both versions remain the first port of call for researchers interested in the clay mineralogy of British sedimentary rocks, but they are also invaluable to those seeking answers to more generic questions of clay mineral evolution during varied geological events at a regional scale (Morgan, 2007; Kemp, 2008).

## Scientific meetings

### Early days

In the early days, the CMG scheduled two scientific meetings per year, one in spring and the other in late autumn to coincide with the AGM that was held traditionally in November or thereabouts. At this time, it was accepted practice to hold the spring meeting at a provincial location, while the autumn meeting and AGM were held in London. It was also common for the proceedings of such meetings to be reported in the scientific journal *Nature*

(e.g. *Nature*, 1947). The meetings varied in length from 1 to 3 days. Initially, 2 day meetings would commence on a Friday and finish after Saturday morning's presentations. Photographs of attendees, including many of the individuals mentioned in this article, at two of the early (1949 and 1953) meetings are shown in Figs 6 & 7. The longer-duration meetings allowed for accompanying field trips, industrial visits or conducted tours of research laboratories, adding considerable interest to gatherings of members with varying backgrounds. Inevitably, this encouraged a great variety in the choice of venue, and meetings have been arranged across the length and breadth of the UK and the Republic of Ireland.

Social intercourse, taking the form of a 'conversazione' in more than one instance, was fostered by organizing a CMG dinner to follow the completion of the scientific session(s) or, if group accommodation had been arranged in, for example, a university hall of residence, a wine or sherry reception in the early evening. There were several favoured dining establishments in London, perhaps the most frequented being the Martinez Spanish restaurant near Piccadilly. Few could have matched the early 1950s records of a three-course dinner with coffee for 7/6d or 8/-. Unfortunately, few photographs were taken of these occasions for archival purposes, but one of a small group of members and guests at an informal dinner in the Royal Athenaeum Restaurant, Aberdeen, on 12 April 1960 was reproduced in the *Clay Minerals Bulletin* (vol. 4, no. 23, page 158) with an accompanying diagram to identify those present.

While many meetings focused on a set topic, others were intentionally left for more general sessions, sometimes titled *Recent Advances in Clay Research* to encourage contributions from ongoing investigations or from current post-graduate studies. The titles of previous CMG thematic meetings demonstrate that, far from being a parochial subject limited to the study of a single small suite of minerals, clay research has wide interests across a spectrum of disciplines and covers diverse applications. Themes in the CMG's earlier years were often introduced with the heading *Clays and ...*, where the associated matter included *Sediments, Geology, Soil Science, Soil Mechanics, Road Engineering, Ceramics, the Chemical Industry and Colloid Chemistry*. Later, as interests and emphasis changed, the associated matter changed to more process-orientated terms such as *Biological Processes, Isotopes, the Environment, etc.* Other meetings centred around the methods and techniques involved in clay science including X-ray diffraction, thermal analysis, infrared studies, spectroscopy, quantitative analysis, beneficiation methods and preparation techniques. Further meetings were devoted to the physicochemical properties of clays, with individual sessions being arranged on particle size and shape, cation-exchange capacity, surface area, clay-water relationships, surface charge and properties, fabrics and geotechnical properties. A few meetings were dedicated specifically to the industrial aspects of clay research under headings such as *Applied Clay Mineralogy* or *Industrial Applications of Clays*, while others have dealt with subjects such as rheology, catalysis and organic reactions with more commercially important implications. Later sessions were organized on the transformation of clays, covering topics on thermodynamics, diagenesis and low-grade metamorphism, while subjects such as the *Environmental and Conservation Aspects of Clay Mineralogy*, the *Geochemistry of Clay-Pore Fluid Interactions*, *Clay Studies in Relation to Health* and the *Role of Organisms in the Genesis of Clays* indicated an ever-widening scope for clay research.





**Figure 6.** Group photograph from the 1949 CMG meeting (University of Leeds). Back row: A. Catherall, A. Humphreys, A.M. Smith, R.W. Grimshaw, J. Hargreaves, A. Westerman, J.L. Amorós, I. Stephen, W.A. Mitchell, J.B. Nelson, G. Brown, F.W. Bird, G.F. Walker, G.H. Whiting, D.C. Henry, J.A. Friend, O. Talibuddeen, D.A. Holdridge, B. Mitchell, H.M. Richardson and D.M.C. MacEwan. Front row: G.W. Brindley, K.E. Seal, J. White, R.F. Youell, G. Nagelschmidt, C.N. Heap, M. Plummer, I.G.C. Dryden, M.W. Strong, R.C. Mackenzie, A.C. Schuffelen, S. Levine, Miss S.Z. Ali, Mrs B.S. Emödi, Miss B.M. Oughton, H. van Olphen, E.L. Mackor, L.L. van Reijen, T.W. Parker and E. Cohen (photograph courtesy of Derek Bain).



**Figure 7.** Group photograph from the 1953 CMG meeting (University of Aberdeen). Fourth row: D.M.C. MacEwan, R.C. Mackenzie, B.S. Neumann and B.D. Mitchell. Third row: R. Greene-Kelly, G. Nagelschmidt, G.W. Brindley, R.H. Barrer, R.H.S. Robertson, C.H.A. de Bruijn, A.E. Pickles and R.F. Youell. Second row: Sadler, G.K. Jones, H.P. Rooksby, G. Brown, R. Deudon and K.R. Farquharson. Front row: D.M. Macleod, R. Hart, K. Carr, E.W. Radoslovich, W.A. Mitchell, A.K. Pringle, D.A. Holdridge and T.R. Parker (photograph courtesy of Derek Bain).

### Joint meetings

CMG meetings that were convened with other Societies on topics of common interest earned excellent support. A total of six such meetings were organized with the British Ceramic Society (Basic Science Section) prior to the late 1970s. However, the interest in such meetings declined as research on raw materials for the heavy clay industries in the UK reduced and newer industrial ceramics did not involve clay minerals. There have also been seven joint meetings with the British Society for Soil Science (BSSS), for obvious reasons, the later ones including *Organic Interactions in Soils and Sediments* (1995) and *Aluminium and Silicon in Soils and the Environment* (2008).

Several meetings have been co-sponsored by various sections of the Royal Society of Chemistry (RSC). One of these, in 1983, with the Thermal Analysis Group (RSC) involved the presentation of 18 papers and two invited lectures under the title *Clays, Minerals and Thermal Analysis*. The meeting was organized as

a tribute to Robert Mackenzie and provided the opportunity for the presentation of an illuminated manuscript recording his 'Distinguished Member' status (see below). Three joint meetings have been arranged with the Society of Chemical Industry, particularly with the Colloid and Surface Chemistry Group. There have even been meetings with the British Rheologists Club and the British Occupational Hygiene Society.

In the area of geology, the CMG has formed excellent relationships with many Societies, including the Geological Society of London. Over 100 delegates attended the joint 1997 meeting *Clay Mineral Evolution, Basin Maturity and Mudrock Properties* convened by Dick Merriman and Simon J. Kemp at the Nottingham headquarters of the BGS (Merriman & Kemp, 1997). The meeting was a response to an ongoing debate generated by recent applications of diagenetic clay-mineral transformations to basin maturity studies and geothermometry and their relationship to organic-matter indicators. A further popular

CMG meeting, *Slips, Shrinks and Swells: Clay Minerals and Geotechnics*, was also held at the BGS offices in 2000 in conjunction with the Geological Society's Engineering Geology Group to examine the contribution of clay minerals to ground movements and civil engineering.

In 1981, a particularly successful CMG joint meeting with the Petroleum Exploration Society of Great Britain (PESGB) entitled *Clays in the Discovery and Recovery of Petroleum* was convened by Chris Jeans and held in the University of Cambridge. This proved to be the forerunner of six further 'Cambridge Conferences' in 1983, 1985, 1988, 1993, 1998 and 2011, in which special emphasis was placed on the features and effects of mineral diagenesis in hydrocarbon reservoirs and associated shales. Later co-sponsors also included the Society of Professional Well Log Analysts (SPWLA), the Geological Society and the ECGA. The meetings proved hugely popular with oil companies, particularly with regard to the burgeoning exploration in the North Sea, and a large cohort of PhD students researching these rocks. As discussed above, oil industry and Joint Association for Petroleum Exploration Courses (JAPEC) sponsorship and the efforts of Chris Jeans enabled the proceedings to be published as weighty special issues of *Clay Minerals*.

The CMG also developed a lasting relationship with the British Sedimentological Research Group (BSRG), mostly through the efforts of Harry F. Shaw, David S. Wray and Simon J. Kemp. The CMG has frequently contributed mudrock-based sessions with invited international keynote speakers to the BSRG annual meeting, usually held just before Christmas. These conferences attract relatively large audiences, mostly composed of enthusiastic PhD students, and they have proved to be useful opportunities to advertise the CMG's activities and interests.

The CMG has also collaborated with the MinSoc in arranging meetings, on two occasions organizing the spring meeting on its behalf, one on *Quantitative Determination of the Mineral Composition of Mixtures* and the other on *Industrial Applications of Clays*. The MinSoc's Winter Conference series often clashed with the CMG's autumn meeting, but, in later times, the CMG participated by arranging the programme for one of the constituent sessions. In 1976, the CMG participated in the MinSoc's Centenary Celebrations and, in particular, the scientific sessions held at the Royal Society's Apartments in Carlton House Terrace, London. The CMG's invited speakers were Brindley (the Group's first Chair, who would become an Honorary Member of the MinSoc), who spoke on *Current and Future Trends in Clay Mineralogy*, and Robertson, who delivered a talk on the *History of Clay Research in Great Britain*. A display of the CMG's archives and publications was also mounted for inspection. Together with the later-formed MinSoc SIGs (Applied Mineralogy Group, Geochemistry Group, Metamorphic Studies Group, etc.), there have also been occasional co-meetings where interests have overlapped (see also below) and ongoing collaboration in producing wider MinSoc conferences (e.g. *Magma to Mud (and Back)*, Reading, 1999; *Minerals and the Environment*, Aberdeen, 1999; *Timing, Transition and Tectonics*, Derby, 2002; *Minerals for Life*, Edinburgh, 2013).

#### Invited speakers

The CMG invited its first guest speaker to a meeting in 1951 and the second in 1961; subsequently, it became a regular event for a known authority to give a presentation on the topic of the day or on their own speciality. In the 1980s and 1990s, some meetings,

especially jointly organized meetings lasting 2 or 3 days, had four or even five invited talks, presented as plenary or keynote lectures. Generally, the invitees were speakers from abroad, and most were from western European universities or institutions, but scientists from North America and even Australia were prominent amongst the distinguished names sought for specialist presentations.

#### Associated visits

It was common for CMG meetings held at research laboratories to include guided tours of their laboratory facilities. Multiple visits were made to the laboratories of the Rothamsted Experimental Station, the Macaulay Institute for Soil Research (later the Macaulay Land Use Research Institute, now the James Hutton Institute), Aberdeenshire, the Institute of Geological Sciences (now the BGS), London and Nottingham, the British Ceramic Research Association, Stoke-on-Trent, the Building Research Station, Watford, as well as the Natural History Museum, London.

Similarly, university departments (most often earth science or geology) providing venues for meetings also offered tours of their facilities. Locations have included the universities of Imperial College London, Cambridge, Southampton, Leeds, Reading, Exeter, Trinity College Dublin, Sheffield, Huddersfield, Durham, Manchester, University College London and Newcastle.

During CMG meetings in the south-west of England, delegates have enjoyed the hospitality of mining companies such as English China Clays (now Imerys Minerals, Ltd) and Watts, Blake and Bearne (now Sibelco) and have visited their clay pits (both China clay and ball clay), processing plants and research laboratories in Cornwall and Devon. Other trips to manufacturing facilities and factories were also popular in the early years of the CMG, but their popularity has waned over time. These included the brick pits and processing plant of the London Brick Company and the Dorking United Brick Company, the fireclay brick factories of Thomas Marshall & Company and the Middleton Company and the ceramic factories of Messrs Hathernware and Josiah Wedgwood. More marginally related to the CMG's core interests, visits have also been organized to Messrs Hadfield's Steel Foundry in Leeds, Pilkington's Float Glass Plant in St Helen's and Van Moppes' industrial-diamond products factory in Basingstoke.

Perhaps surprisingly, very few field excursions have been organized as part of CMG meetings. Only two examples, both to examine soils, deep weathering and periglacial phenomena in Aberdeenshire and the Breckland area of Norfolk, have been recorded. Social excursions, however, have included essential visits to the Guinness Storehouse in Dublin and a whiskey distillery close to Aberdeen.

#### Annual Research in Progress meetings

To appeal to the entirety of a shrinking population of UK clay mineralogists, in 2013, H. Chris Greenwell and Simon J. Kemp proposed to re-establish an annual CMG research in progress (RiP) meeting format, specifically to appeal to PhD students and early-career researchers (ECRs). Annual RiP meetings have since been held at university locations: Durham (on three occasions), Manchester, University College London, Sheffield and Newcastle (on two occasions) and London (Natural History

Museum). These meetings accept contributions on any clay-related subject, are free to attend with lunches provided and offer cash prizes to the best student oral and poster presentations. Most often, these RiP meetings have been solely CMG events, but in both 2014 (Durham) and 2021 (Newcastle) these have been arranged as joint meetings with the MinSoc's Environmental Mineralogy Group.

### **The 6th International Clay Conference (Oxford)**

In the late 1970s, the thriving CMG felt confident enough to bid successfully for and then host the 6<sup>th</sup> ICC, inviting clay researchers to the University of Oxford in 1978. The Department of Zoology lecture theatres hosted the simultaneous presentations, and accommodation was provided at three of the colleges. The impressive event also included a Town Hall civic reception, a sherry party at Rhodes House, a concert at the Sheldonian Theatre, a visit to Blenheim Palace and the conference banquet at Woburn Abbey. Some 320 participants attended from 33 countries.

Two pre- and four post-conference excursions (two in south-west England and one each in north-east England, Midland Valley of Scotland, the Midlands and south-east England) to explore an extensive range of UK clay deposits were led by CMG members and associates. Guidebooks were compiled for each excursion together with similarly styled conference booklets (Fig. 8).

In the scientific sessions, 135 papers were presented orally, and for the first time at an ICC, 50 contributions were displayed as posters. Sixty of the papers were included subsequently in a book of proceedings, published on a royalty basis by Elsevier Scientific Publishing as vol. 27 in their *Developments in Sedimentology* book series (Fig. 8; Mortland & Farmer, 1979).

Although the conference was required to be self-financing, tight budgeting ensured that a surplus of ~£4000 was generated, being split equally between the AIPEA and the CMG. The CMG then used these funds, augmented by a further sum from sales of the proceedings, to support delegate attendance at future ICCs.

The Oxford ICC established a high standard for succeeding conferences, mainly due to CMG Chair Jim A. Bain's meticulous organization. Bain also rose to the challenge of accommodating 'Baby Huff'. US delegate Warren Huff had registered for the conference, together with his wife, Anezka, and new baby, Stephen. Quite understandably, the family wanted to stay in college with all of the other attendees, but Keeble College did not possess a cot. Through Bain's persistence and excellent negotiating skills, one was found eventually. The episode did not deter Huff, and he retained strong contacts with the CMG, being nominated successfully for the MinSoc's Collins Medal in 2021.

### **Golden (50th) Jubilee Meeting**

The CMG's Golden 50th Jubilee was celebrated with a 3 day meeting entitled *Clay Mineralogy Past, Present and Future*, held at the Macaulay Land Use Research Institute, Aberdeen, from 9 to 11 April 1997. A total of 45 papers were presented and published as a commemorative issue of *Clay Minerals* (vol. 34(1), 1–208). Four keynote talks were provided by MacEwan ('The Origin of the CMG', a recorded presentation), M. Jeff Wilson ('The Origin and Formation of Clay Minerals in Soils; Past, Present, and Future Perspectives'), Jan Šrodon ('Use of Clay Minerals in Reconstructing Geological Processes; Recent Advances and Some Perspectives') and Haydn H. Murray (President of AIPEA, 'Applied Clay Mineralogy Today

and Tomorrow'). The meeting was attended by 76 delegates, 31 from overseas, plus 9 accompanying members, and it included many of the past Chairs (Fig. 9) and Editors (Fig. 10). Accommodation was made available at Aberdeen University near to King's College in Old Aberdeen. A civic reception was hosted by Aberdeen City Council at the Town House followed by the conference dinner in Elphinstone Hall, University of Aberdeen. A tour of the Macaulay laboratories was available on the afternoon of the first day, and on the afternoon of the last day there was a trip to the Royal Lochnagar Distillery near Balmoral Castle on Royal Deeside.

### **Euroclay 2015 (Edinburgh)**

Considering the relatively small size of the CMG, it was with some trepidation that Chair John Adams agreed that a bid should be tabled to host the 2015 Euroclay conference in Edinburgh. However, the professional bid, led by Steve Hillier (CMG) and Kevin Murphy (MinSoc), was successful, and plans were initiated for the conference to be held from 5 to 10 July at the University of Edinburgh as a joint meeting with the CMS, the INZA and the Geological Society. Oral and poster sessions were arranged around the three societal themes of energy, materials and environment and health and included six plenary lectures. A bumper total of 520 delegates were attracted by the programme, the pre-meeting workshops and mid-meeting courses. To break up the oral and poster sessions, three field excursions were arranged for the middle day of the conference. Simon J. Kemp led a trip to the classical geology section at Dob's Linn and Grey Mare's Tail in the Southern Uplands (Fig. 11), Chris Jeans and Jennifer M. Huggett lead another trip to examine Devonian and Carboniferous coastal outcrops at Burnmouth, Pease Bay, St Abb's Head and Dunbar, and Jeff Wilson led the final trip to see the classic Hutton's Unconformity at Siccar Point, Berwickshire. The weather was generally good for the trips, but a brief shower at Dob's Linn ensured that the delegates did not escape an introduction to the delights of the Highland midge. A full and memorable accompanying person's programme, arranged by Derek Bain, included trips to Stirling Castle, Rosslyn Chapel and Arthur's Seat, together with whiskey tasting and a tour of the Royal Yacht Britannia. The conference dinner, including a ceilidh, was held at the stunning 'Our Dynamic Earth' exhibition centre.

### **75th Jubilee Meeting, Natural History Museum**

To celebrate the 75th Jubilee of the CMG, a special 2 day RiP meeting was convened as a hybrid event at the Natural History Museum (and online) on 25–26 May 2022 to highlight past and recent advances in clay science. Francis Clegg led a small sub-committee to organize the meeting. The first day consisted of a series of invited talks drawn from past officers and committee members of the CMG (Kemp, Jeans, Claire Fialips, Greenwell and Hillier), followed by a poster session. Behind-the-scenes tours were run by museum staff Mike Rumsey and Javier Cuadros to see some of the mineralogical collections. The conference dinner was held at the nearby Grange Strathmore Hotel, where the MinSoc President (Jon R. Lloyd) and President Elect (Sally A. Gibson) both gave short speeches. The second day mainly consisted of presentations by PhD students and ECRs together with those from the more experienced Ian Wilson and Joe W. Stucki. A group photograph of current and previous CMG officers attending the meeting is shown in Fig. 12.



**Figure 8.** Conference, excursion guidebook and proceedings covers for the 6th ICC (Oxford, 1978).



**Figure 9.** Chairs of the CMG (Golden Jubilee Meeting, Aberdeen, 1997) and guests. Left to right: Chris Jeans, Alan Weir, Jeff Wilson, David Morgan, Jim Bain, Barbara Neumann, Andrew Parker, Harry Shaw, Robert Mackenzie, Robert Robertson, Emilio Galan (guest speaker), Haydn Murray (guest speaker), Andy Rankin (MinSoc President).

### International links

At the time of the CMG's inception, the UK was still recovering from World War II, during which all contacts between UK research

workers and those in European countries and farther overseas had been severed. As clay mineral research had started from a muted level before the War, many links had to be not so much forged afresh



**Figure 10.** Editors of *Clay Minerals* (Golden Jubilee Meeting, Aberdeen, 1997). Left to right: Robert Mackenzie, Derek Bain, David Morgan.

as created anew (MacEwan, 1999). In Europe, like-minded clay mineralogists had also formed bodies such as the Comité Belge pour l'Étude des Argiles (later Belgian Clay Group, now defunct; Dekeyser, 1955), the Groupe Français des Argiles (GFA; <https://france.aipea.org>), the German–Austrian–Swiss Clay Group (DTTG; [https://www.dttg.ethz.ch/dttgorgan\\_en.html](https://www.dttg.ethz.ch/dttgorgan_en.html)), the Sociedad Española de Arcillas (SEA; <https://sea-arcillas.es/en/>), the Gruppo Italiano dell'AIPEA (AISA; <http://www.aipea.it/>) and the Nordic Society for Clay Research (now defunct) to serve their national interests.

Links with French colleagues were established rapidly, particularly with Jacques Méring of the French Centre National de la

Recherche Scientifique (CNRS) and Stéphane Hénin of the Institut de la Recherche Agronomique in Versailles. MacEwan recalled during numerous visits to Paris to see Méring and his collaborators that it became a ritual to go round the corner at midday to a restaurant called Chez Solange, where the food was accompanied and succeeded by long discussions on layer lattices, ion exchange, random interstratification and the configuration of organic molecules. This was the CMG's introduction to continental cafe and restaurant life after the dreary wartime and post-warfare fare available in Britain.

Further afield, the other CMG contacts were mainly with North America, Japan and Australia. The CMS in the USA and the Clay Science Society of Japan, amongst others, have been very active and have issued publications of international repute (*Clays and Clay Minerals*, *Journal of the Clay Science Society of Japan*). The CMG published some of the early work of Toshio Sudo (Tokyo Imperial University; e.g. Sudo, 1954; Shimane & Sudo, 1958) and the early investigations by George F. Walker (previously of the Macaulay Institute for Soil Research before joining the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 1951) into the structure of vermiculite complexes (e.g. Walker, 1957, 1958), unfortunately cut short by his tragically early death.

#### *European Clay Groups Association*

For many years, joint meetings of the (western) European Groups were organized *via* informal agreements to accept invitations from specific members to act as hosts, but later the arrangements were put on a more formal footing. From 1987, such meetings were titled 'Euroclay' conferences. Venues were Leuven (Belgium) in 1971, Strasbourg (France) in 1974, Oslo (Norway) in 1977, Freising (West Germany) in 1980, Prague (Czechoslovakia) in 1983, Seville (Spain) in 1987, Dresden (East Germany) in 1991, Leuven (Belgium) in 1995, Krakow (Poland) in 1999, Modena (Italy) in 2003, Aveiro (Portugal) in 2007, Antalya (Turkey) in 2011, Edinburgh (Scotland) in 2015 and Paris (France) in 2019. The plan to hold the next Euroclay conference in Moscow (Russia) was



**Figure 11.** Euroclay 2015 field trip photograph, Grey Mare's Tail, Moffat, Scotland (photograph courtesy of Simon J. Kemp).



**Figure 12.** Group photograph of current and previous CMG officers (75th Jubilee Meeting, London, 2022). Left to right: Dick Merriman, Chris Jeans, Helen Pendlowski, Francis Clegg, Anke Neumann, David Wray, Ian Wilson, Simon Kemp, Steve Hillier, David Morgan, Chris Greenwell.

abandoned in early 2022 due to the Russian military action in Ukraine, and it has been rescheduled to be hosted in Bari (Italy) in 2023.

CMG members have always played a full part in these conferences: organizing and chairing sessions, presenting papers and posters, running workshops and field trips, participating in committee affairs and, in the early days, even coordinating group travel arrangements. These efforts were raised to an even greater level when the CMG (led by Steve Hillier), together with the MinSoc (led by Kevin Murphy), hosted the 2015 Euroclay conference in Edinburgh (see below). A particular benefit, in addition to the opportunity of participating in accompanying social activities, has been the chance to visit well-studied or classic clay localities during field excursions. The latter have frequently had printed excursion guides prepared to provide permanent reference sources. For British attendees there has been the added advantage that the proceedings and documentation have all been produced in English.

At the Seville meeting (1987), statutes for a formal ECGA were drafted (by David J. Morgan, CMG), agreed and a first President (Fernando Veniale) and Secretary (Radko A. Kühnel) elected. The latter became the second President and was succeeded, as Secretary, by the CMG's M. Jeff Wilson. Some 17 groups were affiliated to the ECGA by 2022 (British and Irish, Croatian, Czech, French, German–Austrian–Swiss, Hungarian, Israeli, Italian, Latvian, Polish, Portuguese, Russian, Slovak, Spanish, Tunisian, Turkish and Ukrainian).

The main business of the ECGA, other than to encourage cooperation between affiliated Groups, is to decide on the venue for future joint meetings. The Euroclay conferences were timed to fall midway in the 4 year cycle of ICCs (see below) and to advise on the policy and administration of the journal, *Clay Minerals*. In the early days it was notable, however, that Eastern European members were the quickest to play an active role in these affairs.

### *Association Internationale pour l'Étude des Argiles*

Officers of the CMG were involved at the earliest stages of the creation of an international organization for encouraging collaboration in the study of clays and disseminating the scientific data

acquired. Initially, in 1948, this took the form of the Comité International pour l'Étude des Argiles (CIPEA), which was established in London under the auspices of the International Geological Congress (IGC). The CIPEA, under the presidencies of Stephane Hénin (1948–1950), Jean Orcel (1950–1952), Ralph E. Grim (1952–1960) and Ivan T. Rosenqvist (1960–1966), subsequently organized 'clay' sessions within individual congresses (Algeria in 1952, Mexico in 1956, Copenhagen in 1960).

During the Copenhagen IGC, Rosenqvist proposed the formation of the independent AIPEA, affiliated with the International Union of Geological Sciences (IUGS), and to hold separately funded international conferences every 3 years (later extended to 4 years). The first AIPEA conference, the 1st ICC, was held in Stockholm in 1963. A few years later, in 1966, the statutes and bylaws of the AIPEA were approved. Further conferences were then convened in Jerusalem (Israel) in 1966, Tokyo (Japan) in 1969, Madrid (Spain) in 1972, Mexico City (Mexico) in 1975, Oxford (UK) in 1978, Bologna and Pavia (Italy) in 1981, Denver (USA) in 1985, Strasbourg (France) in 1989, Adelaide (Australia) in 1993, Ottawa (Canada) in 1997, Bahia Blanca (Argentina) in 2001, Tokyo (Japan) in 2005, Castellaneta (Italy) in 2009, Rio de Janeiro (Brazil) in 2013, Granada (Spain) in 2017 and Istanbul (Turkey) in 2022. The latest conference in Istanbul was delayed for a year from its planned 2021 date due to the COVID-19 (coronavirus) pandemic.

Initially and after refereeing, papers presented during the ICC scientific sessions were published in volumes of proceedings, printed independently by the conference organizers in the country concerned, and so they did not form part of a discrete series. Later, from 2015, papers from individual sessions were allocated formally to one of the three major clay journals: *Clay Minerals*, *Clays and Clay Minerals* and *Applied Clay Science*. The results of the deliberations of the AIPEA clay nomenclature committee have appeared in several clay journals, occasionally (as with a report on illite, glauconite and volkonskoite) being issued as reprints.

The CMG has regularly provided council and committee members for the CIPEA and AIPEA as well as presidents: Robert Mackenzie (1978–1981) and Chris Breen (2009–2013).

Initially, CMG members paid their own individual memberships to the AIPEA. To encourage more CMG members to join,

**Table 3.** Listing of George Brown Lectures.

No.	Year	Lecturer	Affiliation
1st	2000	A. Plançon	Université d'Orléans, France
2nd	2001	P. Komadel	Slovak Academy of Sciences, Slovakia
3rd	2002	V.A. Drits	Geological Institute, Russian Academy of Sciences, Russia
4th	2003	M.J. Wilson	Macaulay Institute for Soil Research, UK
5th	2004	C.T. Johnston	Purdue University, USA
6th	2005	A. Manceau	LGIT Grenoble, France
7th	2007	D.L. Bish	University of Illinois, USA
8th	2008	R.L. Parfitt	Landcare Research, New Zealand
9th	2009	P.H. Nadeau	Statoil, Norway
10th	2009	J.W. Stucki	University of Illinois, USA
11th	2011	H. Heinz	Akron University, USA
12th	2011	J. Cuadros	Natural History Museum, UK
13th	2012	G.E. Christidis	Technical University of Crete, Greece
14th	2013	J.S. Phipps	Imerys, UK
15th	2015	S.V. Krivovichev	St Petersburg State University, Russia
16th	2015	B. Singh	University of Sydney, Australia
17th	2016	L.B. Williams	Arizona State University, USA
18th	2017	P.J. Vrolijk and D.R. Pevear	Exxon, USA
19th	2018	S. Hillier	The James Hutton Institute, UK
20th	2019	T. Kogure	University of Tokyo, Japan
21st	2020 <sup>a</sup>	S. Petit	CNRS, Poitiers, France
22nd	2021	D.A. Manning	University of Newcastle, UK
23rd	2022	Y.G. Mishael	Hebrew University of Jerusalem, Israel

<sup>a</sup> Delayed until 2022.

for a time subscriptions were collected by the Group and forwarded to the AIPEA on their behalf. Following protracted negotiations that lasted many years, in 2018, under the author's Chairship, it was agreed to pay AIPEA membership fees for CMG members directly from CMG funds.

At the 17th ICC held in Istanbul, Turkey, in July 2022, the CMG and the MinSoc presented a successful bid to host the 18th ICC in Dublin in July 2025.

### George Brown Lecture

During the later years of Andrew Parker's Chairship (1995–1998), a small sub-committee of the CMG was convened to formulate a strategy to further promote the CMG, its activities and clay mineralogy in general. As a result, one of the most successful initiatives was the inauguration of a prestigious lecture series in 2000. The series was named after George Brown (Fig. 3), one of Britain's foremost clay mineralogists, a past Chair and Treasurer of the CMG and father of the probably even more famous professional golfer and TV commentator, Ken Brown. The lectures, given on an approximately annual basis, were delivered by speakers invited by the CMG as being recognized as authorities in their field. The lectures are then published open access in *Clay Minerals*. The first lecture was delivered by Alain Plançon (Université d'Orléans, France) at the CMG meeting held jointly at the laboratories of Watts, Blake and Bearne in Newton Abbott and at Exeter University, Devon, on 6 April 2000. A further 22 George Brown Lectures have been presented to date (Table 3).

### Bursaries

Throughout its history, the CMG has assisted generously many researchers and postgraduate students to attend and present research on clay minerals (*sensu lato*) at conferences, workshops and related activities. Initially, a Travelling Expenses Fund was

established to aid members' attendance at overseas meetings, but this was later superseded by more widely distributed bursaries, limited presently to £500 or 50% of costs.

In 2019, under the author's Chairship, the CMG launched an additional annual prestigious bursary: the Mackenzie–MacEwan Award, named after the two initiators of the Group (Fig. 1). The Award (an additional £750) is conferred on a postgraduate student/ECR from those in receipt of an Ordinary CMG Bursary for that year, and it provides funding to present their research orally at a prominent international conference (e.g. ICC, Euroclay, Mid European Clay Conference). In addition, the awardee is expected to present their research orally at the following CMG annual RiP meeting, where the award would be presented.

As part of the 75th Jubilee celebrations in 2022, the Group initiated the CMG Research Grant scheme, offering PhD students or ECRs the opportunity to bid competitively for research funding. These funds are intended to promote, instigate and deliver clay mineral-based research through research group interactions and interdisciplinary research and to kick start independent research paths. Funds can be used to provide mobility, as seed-corn funding to begin a 'proof-of-concept' investigation or to obtain materials, chemicals or small instruments. The recipient agrees to acknowledge the CMG in any outcomes from the funding (papers, conference presentations), with publication in *Clay Minerals* being strongly encouraged. A small final report is also required and published on the CMG webpages.

Full details of the bursary and research grant application processes are available at <https://www.minersoc.org/clay-minerals-group-bursary.html>.

### Images of Clay

In 2005, a further outreach initiative by the CMG (together with the CMS, USA) was launched by Steve Hillier as the Images of Clay archive (<https://www.minersoc.org/images-of-clay.html>). This is a web-based archive of high-quality photomicrograph images of clay (and associated) minerals that are available to download for free for non-profit and educational purposes. A Jubilee year (2022) competition was organized to add further entries, and the archive now holds in excess of 150 images.

### Logo

In 1973, the CMG committee decided to introduce a more formal motif, and a logo was designed and used on headed stationery, posters and advertising products. The letters 'CMG' were arranged within a hexagonal network or superimposed on three contiguous plates of an unspecified clay mineral (Fig. 13). The decision inspired other MinSoc SIGs to design and implement their own logos. The logo remained unaltered, except for the adoption of a colorized version, implemented for the Golden Jubilee (Fig. 13). A redesign was undertaken by draughtsmen at the BGS in 2019, following guidance from Simon J. Kemp, to include the parent MinSoc logo colouration and the Group's 1947 establishment date (Fig. 13). This design was slightly modified for the 75th Jubilee year celebrations (Fig. 13).

### Communication

Originally, the CMG communicated with its membership *via* two printed circulars per year, detailing meetings and other activities. From 1969, the CMG, along with the other SIGs, contributed information to the *Mineralogical Society Bulletin* (Fig. 14).

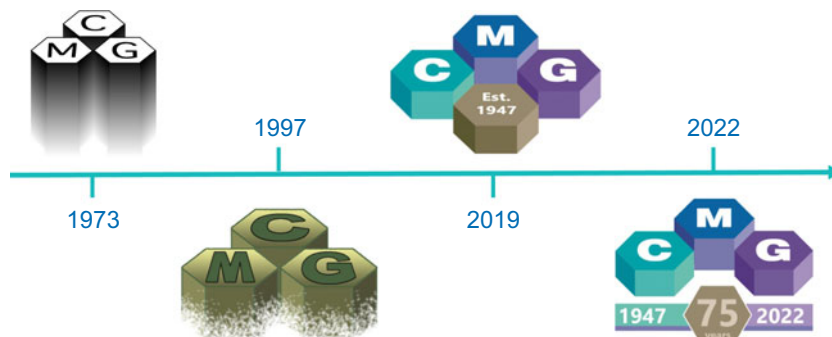


Figure 13. CMG logo designs through the years.



Figure 14. Communication media: *Mineralogical Society Bulletin* cover, *Elements* front cover, Twitter page and *Phyllosophical News*.

When meetings or conferences were scheduled, the CMG would compose advertising flyers and booking forms to form inserts in the *Bulletin*. To differentiate the inserts from the various SIGs, each Group was assigned a different-coloured paper, with the CMG's inserts being a distinctive pink! In 2005, the *Mineralogical Society Bulletin* ceased production, and the CMG's printed information has since formed part of the MinSoc pages in the more widely circulated *Elements* (Fig. 14). In addition, as part of the 2022 Jubilee year celebrations, the

first edition of the digital newsletter *Phyllosophical News* was launched, edited by Maggie White, Megan Baker and Nia Gray-Wannell (Fig. 14). The CMG also contributes smaller items to the more frequent MinSoc e-bulletins.

The MinSoc website (<https://www.minersoc.org/cmgh.html>) was launched in 1998, and the CMG has since maintained a series of associated pages detailing Group announcements and reports as well as links to the Images of Clay, George Brown Lecture, bur-saries and committee contact details. In 2016, Simon J. Kemp



**Table 4.** CMG honours.

<b>Schlumberger/Barbara Neumann Medal</b>	
1990	M.J. Wilson (Macaulay Land Use Research Institute, UK)
2000	P.H. Nadeau (Statoil AS, Norway)
<b>Collins Medal</b>	
2013	C.V. Jeans (University of Cambridge, UK)
2016	M.J. Wilson (The James Hutton Institute, UK)
2021	W. Huff (University of Cincinnati, USA)
<b>Max Hey Medal</b>	
2013	N. Tosca (University of Cambridge, UK)
2014	C. Greenwell (University of Durham, UK)
<b>Hallimond Lecturer</b>	
1970/1971	J.D.C. McConnell (University of Oxford, UK)
2015	N. Skipper (University College London, UK)
<b>MinSoc Honorary Fellows</b>	
1970–1989	R.E. Grim, USA
1972–1983	G.W. Brindley, USA
1992–1997	S.W. Bailey, USA
2013–2019	E. Murad, Germany
1995–	V.A. Drits, Russia
2010–	J.W. Stucki, USA
<b>MinSoc Honorary Life Fellows</b>	
2008–	D.C. Bain (Macaulay Land Use Research Institute, UK)
2011–	C.V. Jeans (University of Cambridge, UK)
2014–	D.J. Morgan (BGS, UK)
2019–	J.M. Adams (Imerys, UK)
<b>Distinguished Members</b>	
1983	R.C. Mackenzie (Macaulay Institute for Soil Research, UK)
2003	V.C. Farmer (Macaulay Land Use Research Institute, UK)

asked Helen Pendlowski to set up and maintain a CMG Twitter account (@CMG\_minsoc). The account quickly became the CMG's primary method of providing rapid communication, and in 2022 it had attracted more than 700 followers. Since 2018, the CMG has also maintained a page on LinkedIn (<https://www.linkedin.com/groups/12122357/>) to promote its activities to industry, both companies and individuals. The CMG also makes use of the MinSoc Facebook page (<https://www.facebook.com/pages/category/Nonprofit-organization/Mineralogical-Society-of-Great-Britain-Ireland-346007840592/>).

### Medals winners and distinguished members

Throughout its history, CMG members have featured regularly in the nominations and successful recipients of the medals and awards of the parent MinSoc (Table 4). Such awards are testament to their outstanding research and scientific standing in the mineralogical community.

In 2020, the CMG (with generous support from BYK Additives) lobbied successfully for the MinSoc's premier medal, founded in 1990 and known previously as the Schlumberger Medal (through the support of Schlumberger Cambridge Research), to be renamed the Neumann Medal after the CMG's first female Chair. Dr Barbara Z. Neumann, also one of the first CMG members, fled war-torn Hungary in 1940 and spent her research career at the Fullers' Earth Union, Surrey (later Laporte Industries), leading to the discovery of the extraordinary product known as Laponite®. Neumann's remarkable story is fully told in a recent paper by Shafran *et al.* (2020).

### MinSoc Honorary Life Fellows

As well as the listing in Table 4, details for the four CMG members who have been granted MinSoc Honorary Life Fellowship are:

2008, Derek C. Bain (CMG Treasurer, 1979–1984, CMG Secretary, 1984–1987, Principal Editor of *Clay Minerals*, 1987–2001, CMG Chair, 2001–2004). Derek Bain is the only CMG member to have held all four CMG officer roles and in continuous service over a period of ~25 years.

2011, Chris V. Jeans (CMG Chair, 1983–1986), Collins Medal winner (2013). As discussed earlier, Chris Jeans was the mastermind behind the six enormously successful (and lucrative) Cambridge Conferences (in the 1980s and 1990s). These conferences, together with a further meeting in 2011, provided an interchange between academia and the hydrocarbon industry and were also the driving force behind the CMG book *Clay Minerals in Onshore and Offshore Strata of the British Isles*.

2014, David J. Morgan (Principal Editor of *Clay Minerals*, 1979–1987, CMG Chair, 1989–1992, MinSoc Vice President, 1998–2000, MinSoc President, 2000–2002, MinSoc Custodian Trustee, 2002–2011). To date, David Morgan is the only CMG member to be elected to be President of the MinSoc.

2019, John M. Adams (CMG Treasurer 1993–1998, Principal Editor of *Clay Minerals*, 2001–2013, CMG Chair, 2010–2014, MinSoc Treasurer, 2013–2018). John Adams provided outstanding service to both the CMG and MinSoc through a range of roles.

### Distinguished Members

The title 'Distinguished Member' of the CMG has been awarded as a mark of esteem to recognize outstanding individual achievements in clay research and in acknowledgement of exceptional service. The Distinguished Member Award of the CMG has only been given twice since its inauguration in November 1983.

The first recipient was Robert Mackenzie of the Macaulay Institute for Soil Research, Aberdeen, Scotland (Fig. 1). The citation itself was printed in a special issue of *Clay Minerals* (vol. 19, no. 5, published in December 1984) dedicated to the proceedings of a joint meeting of the CMG and the Thermal Methods Group of the RSC held to acknowledge Mackenzie's formative influence on and subsequent close association with both groups since their inceptions. MacKenzie helped develop many of the standard techniques used to identify clay minerals and ancillary phases such as sesquioxides and amorphous materials. As part of his multi-technique approach, Mackenzie pioneered the use of thermal analysis, initially with homemade equipment, editing the MinSoc monograph *The Differential Thermal Investigation of Clays* and two further, extended books for Academic Press. Mackenzie's outstanding academic achievements were recognized fully by a suite of medals and awards from other august bodies. He held a long and fruitful association with the CMG, acting as Chair, Secretary and Editor of *Clay Minerals Bulletin*, and he was later elected President of AIPEA (1978–1981).

The second recipient was V. Colin Farmer (Fig. 3), who was made a distinguished member of the Group in 2003 at a special dinner in Aberdeen in honour of his lifetime of research into clay mineralogy and infrared spectroscopy. A joint meeting of the Group with the British Society of Soil Science entitled *Aluminium and Silicon in Soils and the Environment* was held in September 2008, also at the Macaulay, as a tribute to Farmer, who, except for a short period immediately after his retirement in 1983, spent all of his working life there. Farmer made major contributions to our understanding of the mineralogy and chemistry of aluminium and silicon in soils, as well as pioneering the use of infrared spectroscopy in the identification, characterization

and analysis of the reactivity of the amorphous or poorly crystalline secondary minerals involved.

### The future

Having considered the first 75 years of the CMG, it would seem fitting to end this article with some thoughts on the potential future role of the Group.

Clay minerals continue to be a rich source of research interest around the world within the existing areas of earth science, materials science, chemistry and engineering. Presently, much research is focused on processing and modifying clay minerals as adsorbents, catalysts, biomaterials and nanocomposites to support sustainable energy and green initiatives and human health issues. For example, consider the recent explosion of interest in the use of halloysite nanotubes for an ever-diversifying range of nanotechnologies. Indeed, the increasing global threat of climate change and the necessary transition to carbon-free energy production are likely to offer some of the most exciting opportunities for future clay mineral research.

Although spodumene and subsurface brines represent the primary sources of the lithium used in the cathodes of the lithium-ion batteries demanded by electric vehicles, clay minerals represent an alternative/additional lithium source. However, additional research is required to fully understand the chemical partitioning of lithium between clays minerals and brines and to develop economically viable extraction methodologies.

Clay minerals represent one of the most abundant mineral groups in geothermal systems and are used widely as indicators of physicochemical conditions, isotopic tracing, age and the evolution of the heat-flow fields. Clay minerals have always formed important construction materials, but they are now being researched actively for new generations of engineered low-carbon cements to increase the ecological efficiency, self-sufficiency and sustainability of the construction sector. Major infrastructure projects such as High Speed 2 (HS2; the new railway from London to Birmingham and beyond), the siting of wind and solar farms, nuclear power station construction at Hinkley Point and Sizewell, tunnel excavation for the Thames Tideway sewage system and the Stonehenge alleviation scheme all demand clay mineral expertise to understand and mitigate against potentially damaging engineering behaviours.

The efficacy of CO<sub>2</sub> sequestration in soils as the managed sink of soil organic matter or *via* enhanced rock weathering is considered to be governed largely by clay minerals, which provide the most reactive inorganic compounds. Similarly, clay mineral characteristics determine largely whether mudstone caprocks for CO<sub>2</sub>, H<sub>2</sub> and energy storage reach the required level of efficacy for development. Clay minerals, along with other proxies, are used as significant indicators of palaeoclimatic change, providing valuable data for climate models and predictions. The ongoing requirement for new clay mineral science therefore appears beyond doubt.

At the same time, it should also be acknowledged that the number of 'practising specialist' clay mineralogists in the UK and Ireland is probably at its lowest since the advent of the CMG. For many of these scientists and engineers, clay mineral studies may form only a part of their research portfolios or interests.

The CMG is therefore likely to continue to rely on a small, dedicated group of individuals for its future activities. The upcoming ICC in Dublin in 2025 will provide the focus for the Group's efforts in the short term. Initiatives, such as the

introduction of the CMG Research Grant scheme in 2022 will hopefully encourage further areas of clay research and help to build a larger community of all genders by providing the necessary seed-corn funding. Immediate interaction with members and the wider community is now expected *via* social media channels. Recent efforts to raise the profile of *Clay Minerals* have resulted in an increased impact factor (Fig. 5) whilst at the same time retaining rigorous review standards and editorship. For the foreseeable future it therefore seems certain that the CMG will be relevant as it continues to maintain the aims established in 1947. It will be intriguing to see how the CMG has progressed at its centenary celebrations in 2047.

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