

Ten years since Robert C. Mackenzie's death. A tribute to the ICTA founder

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ESTAC2010 Conference Special Issue
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Abstract Dr. Robert Cameron Mackenzie was an eminent scientist who gave a major contribution to the progress of science in the fields of thermal analysis and clay minerals. He was a leading figure in the East–West cooperation at times when these relations were politically very difficult. The authors give an outline of his achievements and some personal recollections of his activity.

Keywords Thermal analysis · Clay minerals · ICTA · DTA

“whoever desires to build a future may not neglect the past” [1].

Fig. 1

Introduction

Robert Cameron Mackenzie was a pioneer in establishing thermal analysis as a novel and accepted technique applied to a wide array of materials in many different areas [1–4].

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He was a leader in the establishment of the ICTA organization and always upfront in its development. He was also internationally recognized as an outstanding figure in the clay minerals world.

Shortly after his passing away in 2000, obituaries describing his activity were published [5, 6]. The authors of this tribute are two old friends of him, who are thankful for all what they learnt from his example and scientific personality and who wish to remind the young generations of thermoanalysts of his achievements, of his former co-workers and of some less-known aspects of his life (Fig. 2).

Robert and the world of clay minerals

His impact on thermal analysis is well known, but it should be stressed that he also gave a substantial contribution to the international clay minerals community. Robert's investigations in the 1950s dealt with the pre-treatments and thermal behaviour of clays and their products [7–14]. He applied what was then an uncommon technique, Differential thermal analysis (DTA), and X-ray diffraction (XRD) in the study of dehydration and rehydration of thermally treated raw materials, sesquioxides and amorphous components. He was a groundbreaker in the investigation of the effect of temperature on water adsorption by organo-clays (e.g. ethylene glycol complexes with montmorillonite or saponite). He also worked on thermochemical reactions of clay minerals with other components (e.g. clays with carbonates), while cooperating with B. D. Mitchell, R. Glentworth (a first-class agricultural surveyor in NE Scotland) and A. A. Milne.

Robert was very good at instrumentation and, for his laboratory, he built a DTA apparatus working under controlled atmosphere [15]. He applied this technique to the



Fig. 1 *Geologist Gianni Lombardi and thermodynamist Jaroslav Šesták were Robert's friends until his last days. They have similar stories in ICTA. Lombardi (*1939), early member of ICTA (1965), of its Standardization Committee (1968–1976), of the editorial board of *J. Thermal Analysis* (1969) and of *Thermal Analysis Abstracts* (1970); ICTA Council (1968–1971), Secretary (1971–1977), Vice and President (1977–1982); Editor 'For Better TA' (1977–1980); ICTA Award (1980); discontinued ICTA 1985. Šesták (*1938), groundwork for ICTA (1965), co-founder of *Thermochimica Acta* (1970), ICTA Councillor-at-large (1977–1982), member of ICTA Nomenclature and Kinetic Committees and the chair of Advanced Inorganic Materials (1984–1996), ICTA Program Chairman (Bratislava 1985), ICTA Award (1992), Affiliated Councillor (1992–2000), discontinued ICTAC 2006

study of soils, where the organic matter is so closely bound to the clay fraction that it is hard to separate them completely and with simple methods. He also used an oxygen flow to study oxidation and combustion reactions and this method became applicable to a much broader range of materials. In 1959, he described his apparatus in a paper, which inspired further instrumental developments in several countries [16–18]. Later, it was commercially produced and used in many British laboratories.

The results of Robert's leading-edge mineralogical investigations were the source for significant papers and stimulated the publication (in 1957, when he was only in his 30s) of 'The differential thermal investigation of clays' [19]. Robert wrote three of the 17 chapters of the book: 'Thermal methods', 'Apparatus and technique for differential thermal analysis' (jointly with B. D. Mitchell) and 'The oxides of iron, aluminium and manganese'. Despite its age, the book is still used all over the world by clay mineralogists.

Robert not only opened new ground in thermal evaluation of clays, but also stands as a maestro in cooperating with and providing guidance to many foreign scientists, who attended his Macaulay Institute for Soil Research to learn and make progress in the field of clays and thermal analysis, among them, G. Berggren from Sweden, S. Yariv from Israel, S. Warne from Australia, N. Yoshinaga from Japan, G. Lombardi, N. Morandi and A. Negro from Italy.

In the 1950s, supported by his knowledge of Russian and German, Robert became aware of the progress made in the eastern countries in the field of clay mineralogy and thermal analysis. He knew the work of Prague O. Kallauner and J. Matějka [20, 21], who conducted an extensive investigation on kaolinite transformations under heating. Their study was influenced by the results of the French H. Le Chatelier and their interactions with K. Friedrich and B. Wohlin (Polish Royal Technical University of Wroclaw), who were investigating the thermal behaviour of bauxitic soils and also built their own apparatus for thermal analysis.

In the early 1960s, contacts between western and eastern scientists were impaired by restrictions not only on travel, but also on correspondence and telephones. Nevertheless, Robert managed to keep in touch with Prague R. Bárta and Polish clay scientists such as A. Kuźniarowa. In 1961, Robert was invited to give a lecture at the Prague Geology Conference and awarded with the distinguished Centenary Medal of the historical Charles University. Then, in 1983, he received the Emanuel Borický Medal from the Faculty of Science of the Charles University during one of the meetings of the European Clay Groups.

Robert's work on clays was well known at international scale. He was instrumental in the organisation of AIPEA (Association Internationale pour l'Étude des Argiles), its President in 1980–1984 and founder of the Clay Mineral Bulletin (today named Clay minerals, the Journal of the European Clay Society). In 1972, he was elected Chairman of the British Clay Minerals Group and, in 1983, he was appointed Distinguished Member. In 1978, he was the convenor of the scientific committee for the 1978 Sixth International Clay Conference and in 1987 Honorary Member of the Sociedad Española de Arcillas.



Fig. 2 Personalities with whom Robert (*first from the left*) collaborated in various areas: Canadian H. G. Mc Adie, Scottish B. D. Mitchell, Swedish G. Berggren, English J. P. Redfern, Hungarians L. Erdey and G. Liptay and Czechoslovak I. Proks

Impact on thermal analysis

In the early 1960s, many western and eastern laboratories used thermal methods for the analysis of both inorganic and organic materials. Based on his international contacts and on the experience gained with the 1957 book on DTA of clays, Robert thought that it would be a great scientific advance if investigators in many fields of thermal analysis could share their experiences within the framework of a multidisciplinary society. His foresight gave birth to ICTA.

Robert was in contact with thermoanalysts L. Erdey and the Paulik brothers in Budapest, the Russian L. G. Berg, the Polish W. Świątosławski and Czech R. Bárta of the Prague Institute of Chemical Technology. Already in the early 1950s, Bárta had organised conferences on thermal analysis, namely Thermography discussions (Prague 1955), the first Thermography day (Prague 1956) and the second conference on Thermography (Prague 1958). After that, Robert was an invited speaker at the 1961 third conference on thermal analysis. He was impressed by the quantity and quality of the results presented at the meetings and got to know the work of Bárta's co-workers, e.g. V. Šatava, S. Procházka, I. Proks and postgraduate student J. Šesták. He also co-authored Bárta's obituary [22].

In the early 1960s, Robert visited the United States and his friend C. B. Murphy (an internationally renowned personality in the field of thermal analysis [23]) encouraged him to organise a large-scale international conference on thermal analysis. Robert began to work on the project, assisted by the Russian L. G. Berg, author of two books on thermal analysis [24, 25], the Hungarian L. Erdey, the Czech R. Bárta, the Japanese T. Sudo, the Canadian H. McAdie and the Swedish G. Berggrenn of Studsvik Actiobolaget Atomenergi (who suggested Sweden as the venue of the first ICTA).

A first Symposium on thermal analysis with scientists from various countries was held at the Northern Polytechnic in London in April 1965. It was organized by B. R. Currell and participants included R. C. Mackenzie, the British D. A. Smith, J. P. Redfern, W. Gerrard, P. D. Garn [26] and W. W. Wendlandt [27] from the US, as well as the Swedish G. Berggrenn, F. Paulik from Hungary and J. Šesták from Czechoslovakia were invited to give plenary lectures, a way to introduce eastern scientists to the international scientific community. The program is a witness of the state of the art of the instrumentation and applications of thermal analysis (Fig. 3).

Soon after there followed a great success. Robert, J. P. Redfern and B. D. Mitchell undertook the organisation of the first International Conference on Thermal Analysis, which was held in Scotland, at Aberdeen, in September 1965 [28] (the registration fees was as low as 15 US \$!). Almost 3,000 copies of the First Announcement were

distributed, with a final attendance of 300 scientists from 29 countries, including Czechoslovakia, Hungary, Poland and USSR.

Robert's merits for the subsequent creation and further development of ICTA are invaluable. The Aberdeen meeting opened the way to the formal establishment of ICTA in 1968 (Fig. 4), during the Business meeting held at the second ICTA in Worcester, Massachusetts (USA). Several ICTAs followed at regular four-year intervals with a large number of attendees and, beginning 1980, intermediate European meetings (ESTAC), promoted by D. D. Dollimore, were also held.

The authors would like to recall two anecdotes which occurred 17 years apart, both with Robert's involvement. At the 1968 Worcester second ICTA, in the evening of 20 August, several delegates were watching the TV news. Suddenly, images of Soviet armoured trucks invading Prague appeared. The three Czech delegates R. Bárta, P. Kralik and J. Šesták were shocked and furious. Šesták attacked the Russian delegate E. I. Yarembash, who was saying that the images were old ones, taken during the 1945 liberation. Robert had to use all his weight and diplomacy to solve a very difficult situation, though tension pervaded the last days of the conference.

In 1985, the eight ICTA was held in Bratislava. The participants were over 400 from 33 countries (and the registration fee had already reached 200 US \$). Robert was invited to give a plenary lecture, together with the Slovak I. Proks, regarding the life of the Czech thinker Comenius and the Scottish scientist Black, two precursors of thermal analysis who lived between the sixteenth and seventeenth century. He not only gave an important scientific contribution, but also helped the conference acting chairman V. Balek and scientific chairman J. Šesták to solve a sensitive political problem. The Czech police had refused the visa to the ICTA Secretary, the Israeli S. Yariv, and to the South African M. E. Brown, because of their 'unfriendly' nationality. US participants were ready to boycott the Conference if the visa was not granted. The result of Robert's diplomatic efforts was that, for the first time in many years, two citizens from the 'hostile capitalist countries', Israel and South Africa, were allowed to visit communist-ruled Czechoslovakia.


A rare case among the British, Robert had not only a splendid command of English, but also reading and speaking skills in Gaelic, French, Italian, Spanish, German and Russian. In 1965, he made the introductory welcome to the International Conference in Aberdeen in English and Russian and, in the same way, he surprised the audience in 1985 with his acceptance speech for a USSR award (Fig. 5).

He never became ICTA president, but until retirement he remained a very active and influential member of ICTA

Fig. 3 The program of the London International symposium on thermal analysis, held in April 1965, the first meeting on the subject with scientists from western and eastern countries. On the left, B. R. Currell, on the right P. D. Garn

**INTERNATIONAL SYMPOSIUM
ON
THERMAL ANALYSIS**

13th and 14th April, 1965



**CHEMISTRY DEPARTMENT
NORTHERN POLYTECHNIC
HOLLOWAY ROAD - LONDON - N2**

TUESDAY, 13th APRIL

MORNING SESSION

Chairman: Dr. J. P. REDFERN

9:30 a.m. Theatre A Introduction by Dr. W. Gerrard
(Head of the Chemistry Dept., Northern Polytechnic)

9:30 a.m. Theatre A "Atmosphere Effects in Differential Thermal and Thermogravimetric Analysis"
Prof. P. D. GARN (University of Akron, Ohio)

10:45 a.m. Coffee

11:15 a.m. Theatre A "Derivatography"
Prof. L. ERDEY (Technical University of Budapest)

12:30 p.m. Lunch

AFTERNOON SESSION

2:00 p.m. Theatre A "General Aspects of Thermal Analysis"
(Papers A1-4)
Chairman: Prof. P. D. GARN

3:30 p.m. Tea

4:00 p.m. Theatre B "Applications of Thermal Analysis to Inorganic Compounds I" (Papers B1-4)
Chairman: Prof. W. W. WENDLANDT

Theatre C "Applications of Thermal Analysis to Polymer Solids" (Papers C1-4)
Chairman: Mr. D. A. SMITH

Theatre D "Techniques of Thermal Analysis I" (Papers D1-4)
Chairman: Dr. B. R. CURRELL

Close—5:30 p.m.

WEDNESDAY, 14th APRIL

MORNING SESSION

Chairman: Dr. R. C. MACKENZIE

9:30 a.m. Theatre A "The Causes of Error in Thermogravimetry"
Dr. M. MARCELIN (C.N.R.S., Paris)

10:45 a.m. Coffee

11:15 a.m. Theatre A "Miscellaneous Thermal Methods"
Prof. W. W. WENDLANDT (Texas Technological College)

12:30 p.m. Lunch

AFTERNOON SESSION

2:00 p.m. Theatre A Chairman: Dr. J. P. REDFERN
"Kinetic Studies by Thermogravimetry"
Dr. G. GUONON (Geste Polytechnique, Paris)



3:00 p.m. Tea

3:30 p.m. Theatre B "Applications of Thermal Analysis to Inorganic Compounds II" (Papers B5-8)
Chairman: Dr. M. J. FRAZER

Theatre C "Applications of Thermal Analysis to the Study of Organic Compounds (Including Polymers)"
(Papers C5-8)
Chairman: Mr. D. A. SMITH

Theatre D "Techniques of Thermal Analysis II" (Papers D5-8)
Chairman: Dr. R. C. MACKENZIE

Close—5:30 p.m.

KEY NOTE PAPERS *1*

"General Aspects of Thermal Analysis"
Chairman: Professor P. D. Garn

Theatre A Tuesday: 2.00 - 3.30 p.m.

A1 "The Standardisation of Experimental Conditions in Thermal Analysis"
F. Paulik and J. Paulik (Technical University of Budapest)

A2 "Procedural Variables Influencing the Thermogravimetric Study of Polymer Decomposition"
D.A. Smith (Petroleum College of Solber Technology, London)

A3 "The Use of Thermal Standards in Thermogravimetric Analysis"
G.J. Kestich (Johns Insulating Research and Development Ltd., Zetland Wood)

A4 "The Error of Kinetic Data Obtained from Thermogravimetric Traces at a Rising Temperature"
J. Šesták (Institute of Solid State Physics, Czechoslovakia)

and a basic point of reference for all Council and ordinary members. Treasurer more than 15 years, he created a sound financial basis for ICTA and gave a great scientific contribution as chairman of the Nomenclature and member of the Publication and Standardization Committees. From 1986 to 1997, he was editor of ICTA News.

Though not many were aware of it, the Scottish and Irish 'mafia' occupied the dominant ICTA positions for a long period. In addition to the obvious Mackenzie and McAdie, there were others (Fig. 6). Gallagher and Murphy were members of well known Irish Clans and Lombardi has solid roots in the Clan McGillivray (Fig. 9).

Robert's major contribution to thermal analysis was scientific, with over 100 papers and review articles [2], as well as the editorship of three books, which stand as milestones in their field. He was particularly concerned with the improvement of thermoanalytical techniques and theory and their wider applications. In later years, the

nomenclature and history of thermal analysis became his main interests. In a fundamental paper of 1974 [1], he summarised his ideas about the future development and the classification of thermal analysis methods, a subject covered in other papers.

The first book that he edited, 'The differential thermal investigation of clays', leads back to 1957 [19]. The second was 'A handbook on DTA' in 1966 [29]. The two volumes of his third book, 'Differential Thermal Analysis', were published by Academic Press in 1970 and 1972 [30]. There are 25 chapters and he is the author of four of them: 'Simple phyllosilicates based on gibbsite- and brucite-like sheets', 'Oxides and hydroxides of higher-valence elements' (with G. Berggren), 'Basic principles and historical development' and 'Instrumentation' (with B. D. Mitchell). The book still represents a bible on DTA applications, dealing with different problems such as theory, experiments, geosciences, nomenclature and history.

Fig. 4 The composition of ICTA Council in the first 12 years of its life. In the photos, from the left: R. C. Mackenzie, L. G. Berg, C. B. Murphy, R. Bárta and H. Kambe

The first executives of the International Confederation on Thermal Analysis				
ICTAC	1965-68	1968-71	1971-74	1974-77
President	L.G. Berg (USSR)	C.B. Murphy (USA)	H.R. Oswald (Switzerland)	H. Kambe (Japan)
Vice-President	---	R. Bárta (Czechoslovakia)	H. Kambe (Japan)	H.G. McAdie (Canada)
Secretary	J.P. Redfern (England)	J.A. Hill (USA)	G. Lombardi (Italy)	G. Lombardi (Italy)
Treasurer	R.C. Mackenzie (Scotland)	R.C. Mackenzie (Scotland)	R.C. Mackenzie (Scotland)	R.C. Mackenzie (Scotland)
Past-President	---	L.G. Berg (USSR)	C.B. Murphy (USA)	H.R. Oswald (Switzerland)
Ordinary members	R. Bárta (Czechoslovakia) S.K. Bhattacharyya (India) C. Duval (France) L. Erdey (Hungary) T. Sudo (Japan) D.J. Swaine (Australia)	S.K. Bhattacharyya (India) C. Duval (France) H. Kambe (Japan) G. Krien (BRD) G. Lombardi (Italy) D.J. Swaine (Australia) T.L. Webb (South Africa) E.I. Yarembash (USSR)	P.K. Gallagher (USA) M. Harmelin (France) M.D. Karkhanavala (India) G. Krien (BRD) O.T. Sørensen (Denmark) S.St.J. Warne (Australia) T.L. Webb (South Africa)	P.K. Gallagher (USA) M. Harmelin (France) M.D. Karkhanavala (India) V.B. Lazarev (USSR) H. Lehmann (BRD) F. Paulik (Hungary) O.T. Sørensen (Denmark) S.St.J. Warne (Australia)
Chairmen of Committees			R. Bárta, Honorary president (Czechoslovakia)	
Standardisation	H.G. McAdie (Canada)	H.G. McAdie (Canada)	H.G. McAdie (Canada)	P.D. Gam (USA)
Nomenclature	R.C. Mackenzie (Scotland)	R.C. Mackenzie (Scotland)	R.C. Mackenzie (Scotland)	R.C. Mackenzie (Scotland)
Publications	J.P. Redfern (England)	J.P. Redfern (England)	J.P. Redfern (England)	J.P. Redfern (England)
Organising for next Conference	C.B. Murphy (USA)	M. Müller Von Moos (Switzerland)	F. Paulik (Hungary)	S. Seki (Japan)



Fig. 5 Bratislava 1985. Dr. Mackenzie receives the USSR Kurnakov Medal from the hands of Prof. V. B. Lazarev

He helped to improve the DTA theory [30–34] and his fine usage of English, together with extreme care for details and forward-looking considerations, made him a prominent figure in the nomenclature field. For many years, he was

the soul of the nomenclature activity of both AIPEA and ICTA and strongly influenced the preparation of widely accepted complex documents on the subject [e.g. 35–41]. He had the great merit of creating derived nomenclatures, even in different languages [42, 43].

The vast knowledge of the field led him to devote the last part of his scientific life to the many aspects of the history of thermal analysis [44–50]. He is credited with new findings on the impact of G. Martine as a very early thermoanalyst, on the responsibility of J. Comenius in the earliest use of the term ‘caloric’ and on the role of G. A. Charpy in the development of electric furnaces. These studies produced an excellent compendium of thermoanalytical history [45], a source for many subsequent studies. He kept close contacts with the Slovak I. Proks from Bratislava and inspired his work, which resulted into various papers on the history of thermodynamics [51–55]. With J. Šesták, he prepared an article on a thermoanalytical



Fig. 6 July 1977. ICTA executives at the fifth ICTA of Kyoto (Japan). *Upper row* H. R. Oswald, P. K. Gallagher, H. G. McAdie, S. St. J. Warne, J. P. Redfern, R. C. Mackenzie and F. Paulik. *Middle row* C. B. Murphy, S. Seki, W. D. Emmerich, G. Lombardi and H. Kambe. *Lower row* P. D. Garn, Mrs. Kambe, Mrs. Lombardi, Mrs. Murphy, Mrs. Warne and Mrs. Gallagher. In the long period when Robert was ICTA treasurer, Murphy and Gallagher (US with Irish roots), Canadian McAdie and Italian Lombardi (Scot roots) were elected ICTA Presidents

journey from prehistory to the third millennium; its completion was interrupted by his death, but anyhow it was published in JTAC [56].

Robert was very much aware of the need to have an easy access to the thermoanalytical data dispersed in the literature. As early as 1965, he collected and ordered the results of DTA of minerals and other substances and prepared a punched-card data index named SCIFAX, published by Cleaver-Hume Press. The index was based on the temperatures of the DTA peaks and with its help it was much easier to identify the products obtained during the decomposition processes.

Fig. 7 The international editorial board in the first years of Journal of Thermal Analysis and Thermochemica Acta. Photos of W. W. Wendlandt and J. Simon

JOURNAL OF THERMAL ANALYSIS		thermochemica acta	
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Other countries <i>F. Paulik</i> Technical Univer XI. Gellért tér 4		VOLUME 1 (1970) W. W. WENDLANDT (Houston, Tex.)	
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Many people are indebted to Robert for all what he contributed to the many fields of thermal analysis. He also received official recognitions for his activity, e.g.: Fellow of the Royal Society of Edinburgh (1961), Fellow of the Royal Society of Chemistry (1961), Mettler NATAS Award (1968), SAC Gold Medal Royal Society (1980), Netzsch GEFTA Award (1982), ICTA/TA Award (1985), NATAS Fellow (USA 1985), Kurnakov medal (USSR 1985) and First Honorary Member of ICTA (1988).

Some personal notes

Robert was born on 7 May 1920 from a family of farmers living in the Portmahomack area, a lovely small village on the eastern coast of Northern Scotland, beautifully preserved. He attended first the Tain Royal Academy and then the Edinburgh University. In 1942, he obtained a B.Sc. with First Class Honours in Chemistry and, in 1944, he completed his Ph.D. thesis dealing with gas-phase reaction kinetics. In the same year, he joined the Aberdeen Macaulay Institute for Soil Research, where he remained throughout his scientific life, becoming the head of the Physical Chemistry Section and then of the Department of Pedology, until his retirement in 1983.

In 1950, he married Hilda Bruce, a fellow member of the Macaulay, and it was a very happy marriage. They were always very close to each other, though she seldom travelled with him to professional commitments. They had a son, Bruce, now a retired reservoir engineer and consultant in the oil industry, living in Edinburgh, and a daughter, Morag, married with a farmer and living on a large estate close to the Aberdeen airport with a son and a daughter (Fig. 8).

He liked to travel and had many experiences abroad as visiting professor, or for lectures and meetings. He was a keen and fast driver and for many years, in the 1960s and



Fig. 8 Dr. Mackenzie in a picture of August 1999 with his daughter, grandchildren, G. Lombardi and his wife

1970s, he used to drive his Bentley to Positano (southern Italy) for a family holiday.

No better words can be used to describe his personality than those in the obituary written by J. Wilson, a colleague of him at the Macaulay [6]: ‘To many, he embodied the very essence of the “English” gentleman (despite being a true Highland Scot), unfailingly courteous and fair-minded, but with a patrician demeanour which invested his lectures and pronouncements with an aura of authority’.

The Macaulay was attended by visitors from all over the world and Robert was always very, very polite, though often shuddering at the quality of the English language spoken by some foreigners. Many Italians worked at the Macaulay with him and one of them (F. Palmieri) was sent to the ceremony for his retirement. He handed him a set of tiles (Fig. 9) with a dedication which well expresses the feeling of the many Macaulay visitors:

On the occasion of the retirement of Dr. Robert C. Mackenzie, the Italian visitors to the Macaulay Institute for Soil Research present this plaque to “Mac”, with heartfelt thanks for all what he contributed to their professional background. We join all those who admire his stature in the field of thermal analysis, clay mineralogy and soil science, but we are also very grateful for his interest in our scientific and personal problems, that he shared with us throughout the years and for his stoic patience in bearing with



Fig. 9 Handmade tiles given to Dr. Mackenzie on his retirement by the Italian visitors of the Macaulay and G. McGillivray Lombardi (*on the right*) at a 2009 party in Inverness



Fig. 10 On the right Dr. Mackenzie's family grave in the cemetery of the Portmahomack church and his tombstone

our continuous murdering of the English language, for which we publicly apologise. We went to the Macaulay as young researchers, we have grown to become Professors, but we will never forget the stimulating periods of research and study we had in lovely Aberdeen. Thanks Mac and arrivederci a presto. Gianni Lombardi, Noris Morandi, Alfredo Negro, Francesco Palmieri, Pietro Violante, November 1983.

After leaving the Macaulay, Robert continued to work and keep a keen interest in the history of thermal analysis, maintaining pen contact with his many friends. Then, his wife's health declined and he patiently assisted her for many difficult years, always in the same home in Aberdeen, up to when she died in 1998.

Robert's funeral was held in Aberdeen on a Monday, a few days after his death in July 2000. There were his old Macaulay colleagues and many friends of the family. One of the authors (G. L.) was the only ICTA representative. Together with the family, he went north to Portmahomack and had the moving privilege to help him lie down in his grave (Fig. 10). Still visiting Scotland every one or two years, Gianni feels a duty to bring a flower to the grave, on behalf of his many friends and in memory of a gentleman who gave so much to the world of science.

Acknowledgements The authors thank Brian Currell, Georgy Lip-tay, Morag Mackenzie, Judit Simon and Shmuel Yariv for their collaboration in preparing this article. The grant support in the field of geopolymers No FR-TI 1/335 is appreciated.

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