



**A HISTORY OF**  
**THE BRITISH ASSOCIATION**  
**FOR CRYSTAL GROWTH**  
**1969-2009**

COCKAYNE • HURLE • ROBERTS



# **A HISTORY OF THE BRITISH ASSOCIATION FOR CRYSTAL GROWTH 1969-2009**

Written by Brian Cockayne, Don Hurle and Kevin Roberts, with Graphic Design by Terry Bambrook

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**BACG** \_\_\_\_\_  
*British Association for Crystal Growth*  
Registered Charity No. 261780





## DEDICATION

To the memory of the life and work of

Brian Cockayne

1936 - 2006



## FOREWORD

The British Association for Crystal Growth (BACG) was one of the first national associations formed after the ground-breaking first International Conference on Crystal Growth in 1966, which first brought together a community of scientists belonging to such seemingly disparate fields as crystallography, physics, chemistry and mineralogy, to name but a few. Step changes in the field of crystal growth were made in the 1940s and 1950s thanks, for example, to the pioneering work of Sir Charles Frank, the first President of the BACG, and, as a result of these, crystal growth emerged as a separate discipline. Amazing to think that initially the move to bring together those active in this field was met with opposition by some, who still viewed crystal growth as a branch of crystallography! We now know that, in the last 50 years, applications of crystal growth have aided the advancement of electronic and optical materials, the food and polymers industry, and pharmaceuticals amongst others.

This year, the BACG celebrates its 40th anniversary, the foundation meeting having been held on 25th June 1969 in London and first Annual Conference in Bristol in 1970. It continues to play a vital role in supporting and bringing together scientists involved in the field, whether emerging or established, working on small or large molecules, inorganic or organic material. This booklet charts its history, and I hope that upon reading it you will, as I have, feel proud to be part of a unique scientific community.

Ivan Marziano  
Chairman of the BACG  
Pfizer Global Research and Development  
September 2009





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## NOTES ON THE AUTHORS

**Brian Cockayne** obtained BSc, PhD and DSc degrees from the University of Birmingham where he briefly became a lecturer before joining the Royal Radar Establishment in Malvern. He had an international reputation for his research at Malvern firstly, and principally, into the Czochralski growth of high melting point oxides and later for studies of the organo-metallic vapour phase epitaxy of compound semiconductors and oxides. He was Chair of BACG from 1975 to 1977 and successively Executive Committee Member, Vice President and President of IOCG from 1977 to 1992. Sadly he died in 2006 after bravely bearing a long illness.

**Don Hurle** obtained BSc, PhD and DSc degrees from the University of Southampton, joined the Royal Radar Establishment, Malvern, in 1959 and retired in 1991. His early research was into the effects of constitutional supercooling and of melt convection on the defect structure of melt grown semiconductor crystals. Later work concerned the automation of the Czochralski growth process and point defect incorporation in III-V compounds. He was BACG Chair from 1991 to 1994, BACG President from 1997 to 2000, on the Editorial Board of J. Crystal Growth for 25 years and edited the three volume 'Handbook of Crystal Growth'.

**Kevin Roberts** obtained BSc and PhD degrees from Portsmouth Polytechnic carrying out his PhD on the characterisation of crystal growth mechanisms under the supervision of Dennis Elwell, the BACG's first secretary. He was an EPSRC Senior Fellow and faculty member at the University of Strathclyde gaining his DSc from there in 2004. Currently he is the Brotherton Professor of Chemical Engineering at the University of Leeds where





he remains an active crystal growth researcher, focussing nowadays on the industrial crystallisation area, notably in pharmaceutical crystal growth. He was BACG Vice-chair/Chair from 2002–2006, is currently on the IOCG Executive Committee and the Editorial Board of Crystal Growth and Design.

**Terry Bambrook** obtained BA (Hons) degree from Leeds Polytechnic, and PGCE (ICT) from Trinity & All Saints College, Leeds. He has been a freelance graphic designer from 1984 to 2007, and has produced a wide range of printed and web-based publicity and promotional materials for the BACG and other learned institutes, and especially for the University of Leeds. He is now a secondary school teacher and part-time freelance graphic designer.




## PREFACE

Interest in the crystalline state and the manner in which crystals are formed goes back many centuries. The growth of crystalline materials is of importance to many different groups of scientists, technologists and engineers from both the commercial and academic sectors, notably in: mineralogy and resource exploration; chemical and petroleum processing and manufacturing; metallurgy and steel making; ceramics and refractory materials; and electronic and opto-electronic materials.

During the pre-war and war period, and long before the BACG was even thought of, the study of crystals, their synthesis and their morphology gradually developed from a peripheral activity into a concerted discipline. Initially it was concerned with the production of sapphires and rubies for bearings in watch making and allied industries, synthetic quartz for frequency oscillators and EDT, Rochelle salt, KDP and Perovskite crystals for piezoelectric sonar sensors.

The birth and growth of the micro-electronics industry in the post-war period led to the creation of new semiconductor crystals of a quality never seen before resulting in the development of the associated engineering science and production technology needed for their precision manufacture. Through this, large, highly pure and highly perfect single crystals of germanium and then later silicon for solid-state electronic devices were produced. There followed III-V and II-VI semiconducting materials which opened up the field of opto-electronics with a wide range of devices including light emitting diodes, semiconductor lasers, infra-red detectors.





The drive for new crystal growth technology promoted, in turn, increased activity in the academic sector resulting in a renaissance in the development of crystal growth theory. The state of the art was presented at the Royal Society of Chemistry's 1949 5th Discussions of the Faraday Society at which the BACG's future president Charles Frank presented his paper on the role of screw dislocations on the crystal growth process. The latter led, two years later, to Burton, Cabrera and Frank's (BCF) seminal work on the "The Growth of Crystals and the Equilibrium Structure of their Surfaces" (Philosophical Transactions of the Royal Society of London A 243 (1951) 299-358).

In the following years a wide range of technological demands for semiconductors, integrated circuits and new laser materials led to even higher materials specifications with the concomitant development of theory and advanced characterization techniques. This activity had an impact on within the chemical industry leading to the application of crystal growth science in the improvement of the isolation and purification of solid products synthesized in the manufacture of bulk chemicals, speciality materials and pharmaceuticals.

The above backdrop sets the scene for publication of this booklet which has been put together to mark the Association's 40th anniversary celebrated at the 2009 Annual Conference in Bristol. This history traces the development of the BACG from the above formative origins through to the development of an embryonic community through the 1950s and 1960s to the Association's formation. It follows the Association's rapid growth in the 1970s and 1980s and its subsequent restructuring in the 1990s through into the Millennium.

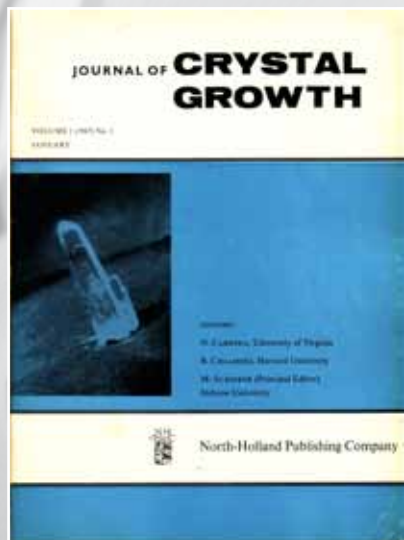
The writing of the historical review draws on a previous version of the Association's history ably written by former BACG chair Brian Cockayne for the 21st Anniversary of the association in 1990 which has been updated by the other co-authors of this version who warmly dedicate this edition to his memory. Brian's obituary, which is published on the BACG Web Site (<http://www.bacg.org.uk>), is reproduced in full in Appendix A.

Don Hurle, Kevin Roberts and Terry Bambrook,  
September 2009





## NUCLEATION OF THE ASSOCIATION THROUGH THE 1950S AND 1960s



*The first edition of the Journal of Crystal Growth, published in 1967.*

The very first international crystal growth conference, "The Growth and Perfection of Crystals" took place in the same year that the solid state laser action was discovered in rubies, 1958. The conference, held in Cooperstown, USA, attracted only 63 scientists – many being invited, and all seven from the UK were University academics, not from industry. As time went by, meetings were organised in the UK, with many future founders of the BACG being involved. Two of these meetings in the early 1960s, were centred on electronic materials research, co-ordinated under the auspices of the Department of Naval Physical Research. The first conference had 33 papers presented, and a healthy increase to 44 papers was seen at the second conference. Several young scientists had made known their interest in crystal growth in these presentations. Many will recognise the names of Frank Ainger, Bill Bardsley, R W Brander, John Brice, Brian Cockayne, Don Hurle, Bruce Joyce, Bernard Lunn, Brian Mullin, Barry Straughan, Eric White, John Wilkes and John Woods, as they all served on future BACG committees.

In 1965, the first educational courses specifically centred on crystal growth appeared with the first being established in November 1965 by D J Morantz, at Woolwich Polytechnic in the Division of Materials and Molecular Science. In January 1966, the second course on the "Synthesis and Analysis of Electronic Materials" was organised by Julian Goldsmith at Bristol College of Science and Technology. These courses proved very popular attracting between 30 and 60 delegates on each occasion and as a result they became regular events at both venues, with additional development at Woolwich by R A M Scott, and at Bristol by Brian Pamplin. The Bristol courses became annual events up and until in 1970 when they were incorporated into the Mott Schools on Crystal Growth, the first of which

was held at Bristol University in that same year. Both the principal invited speakers and many of the delegates became core members of the BACG.

In addition to this, expertise in both the fundamental and applied aspects of industrial, largely solution-based, crystallization processes associated with the production of bulk chemicals was also being developed, notably through the work of John Mullin and R F Strickland–Constable at University College London. This activity was strongly supported by the UK's chemical industry. For example, in the early 1960s Tate and Lyle funded Bill Dunning at the University of Bristol to work on sucrose, studies that expanded his war time work on explosives. ICI, who employed two of the UKs most eminent crystal scientists A F Wells and Charles Bunn, funded a research fellowship to N Cabrera to work with Charles Frank at Bristol on the BCF paper whilst the MOD at Waltham Abbey maintained activity in the solution crystal growth of explosive materials. Work of this period is to be found in the contents of the 1969 symposium on "Industrial Crystallisation" published by the Institution of Chemical Engineers (IChemE) with contributions from UMIST, Ministry of Technology, Waltham Abbey, BP, Tate & Lyle, Simon Engineering, Power Gas Corporation, A.B.M. Industrial Products and University College London.

In 1966, several International events of importance to the founding of the BACG took place. In June and July, there were conferences on crystal growth occurred in Boston and Moscow, the former organised by Michael Schieber. It was sponsored by the Solid State Commission of the International Union of Pure and Applied Physics (IUPAP). The Moscow event had sponsorship from the International Union of Crystallography (IUCr), and was organised by N N Sheftal. To obtain Soviet support for the Boston meeting, several of the organisers pledged themselves to attend the Moscow meeting and report its proceedings



to the Boston meeting. At the latter Bill Bardsley was elected president of a provisional international committee (Comité International de Croissance Cristalline) charged with establishing an international organisation and with holding a second international conference in the UK. This duly took place in Birmingham University in 1968, co-chaired by Bill and by the Professor of Physical Metallurgy, Alan McQuillan. The Boston meeting has become known as ICCG1 and the Birmingham meeting as ICCG2.



ICCG2 brought together, for the first time, a large number of British scientists with interests in this area of scientific activity. Almost simultaneously in the USA, the success of the Boston conference had led to the American crystal growth scientists meeting in an ad hoc way to discuss and form their own national organisation, the American Association for Crystal Growth (AACG), in December 1967. These events naturally led many groups in the UK to suggest the formation of a corresponding British organisation, and at a meeting of 65 UK delegates to ICCG2 in Birmingham, a resolution was passed under the Chairmanship of T B Copestake. This resolution stated that:

*"The British Organising Committee of the 1968 ICCG shall be asked to examine the possibility of establishing, either by negotiation with existing professional bodies or independently, a UK crystal growth group and to report to a meeting to be organised in the autumn by Dr E A D White".*

This was much in the spirit and direction desired by the BOC, and in their last meeting in 1968 on 8th December their final minute records two resolutions:

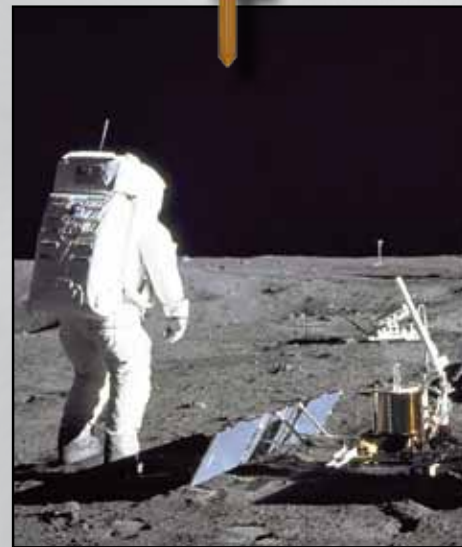
*"(a) That a group comprising Professor McQuillan (Chairman), Dr Bardsley, Professor Frank, Mr Goodman, Professor Hoselitz, Dr Pashley, Dr Strickland-Constable and Dr White consider mechanisms by which a British Committee on Crystal Growth could be created and;*

*(b) That Professor McQuillan accept the invitation of Dr D Elwell to make a statement on behalf of ICCG 1968 at the meeting on crystal growth to be held on 18th December 1968 at the Physics Department, Imperial College, London."*

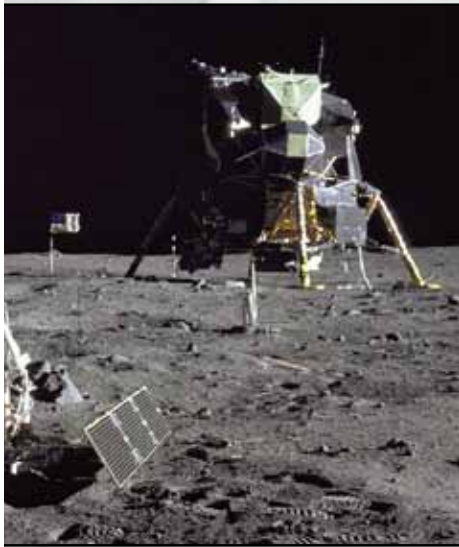
In this way, Alan McQuillan duly reported the BOC position to a business meeting, attended by 57 people, which, after much discussion, passed a resolution that a Holding Body be formed to draft a Constitution for a British Society for Crystal Growth. Secondly, it was to call a General Meeting for the following Spring to approve the Constitution and elect a Committee. The Holding Body proposed was Alan McQuillan, Bill Bardsley, Colin Goodman plus two or three others to be co-opted.

Detailed records of this initial body's activities were not kept or have been lost in time, but we know it held meetings on 30 January 1969, and 28 March 1969 and added Dennis Elwell, John Mullin and Eric White to its membership. It appears that the Holding Body became an Interim Committee and eventually a Steering Committee. It is, however, clear that the BACG constitution was drafted by Alan McQuillan in consultation with people named above, as well as others.

1969 may have been the year men landed on the moon, but it was also the year of the Foundation Meeting of the British Association for Crystal Growth, the name as agreed by the Steering Committee. It was held in the Department of Chemical Engineering at Imperial College, London, where the constitution was adopted and the Association founded with little or no dissent. Great competition took place for the post of Chairman and for Committee places.



*The BACG held its Foundation Meeting at Imperial College in 1969 – the same year that Neil Armstrong set foot on the moon.*



The first elected Committee was: Alan McQuillan (Chairman), Bill Bardsley, John Brice, Dennis Elwell, Charles Frank, Colin Goodman, Bruce Joyce, Brian Mullin, Barbara Wanklyn and Eric White.

At the first meeting, Dennis Elwell became the Secretary and John Brice the Treasurer. Most importantly, this meeting outlined the arrangements for enrolment of members and an initial programme of future conferences. A noteworthy observation on the letter inviting membership to interested parties is the low cost of subscription which remained the same until 1987. Another is that John Brice, as Treasurer, opened the first BACG Bank Account with his own membership cheque and therefore automatically became the first member. A number of historical documents relating to the Association's formation, including the original BACG Constitution, are reproduced in Appendix B whilst the BACG's current constitution is given in Appendix C. Appendix D provides a full list of all the Association's principal officers.





## GROWTH OF THE ASSOCIATION THROUGH THE 1970s

During its initial full year of existence, BACG established the first in its cycle of one-day meetings and annual conferences, these being held respectively at Oxford and Bristol Universities. For the first one-day meeting at Oxford on 9 January 1970, Minute 22 records that:

*"The conference fee will be 25/-d to members and 35/-d to non-members. Lunch will be in Balliol College at a charge of 12/6d. Overnight accommodation at the College is available on 8th January at a cost of 48/6d".*

At the first Annual General Meeting (AGM), held during the Annual Conference, it was reported that the initial membership was 80 but this had increased steadily during 1970, reaching 168 by the end of that year. Members were provided with a distinctive yellow membership card which was required to be produced for inspection by the society's officers when requested. Examination of the financial records at that time revealed that on 20 July 1970 the financial situation was positive with the sum of £99.17s.6d in hand. This latter point is in itself historic since, shortly afterwards, the 's' and 'd' states were forced into 'p' orbitals by Act of Parliament – the process being called 'decimalisation'!

The BACG Annual Conference has provided the focal point for members each year and has always included the Annual General Meeting. The conferences have traditionally provided a sympathetic and helpful forum for first-time speakers, encouraging presenters to develop their delivery skills. The expansion and promotion of interest in crystal growth in fresh minds via the provision of educational lectures have largely been the responsibility of individual members, and many have provided lectures at suitable levels ranging from



*Left – A typical membership card from the early days of the BACG.*

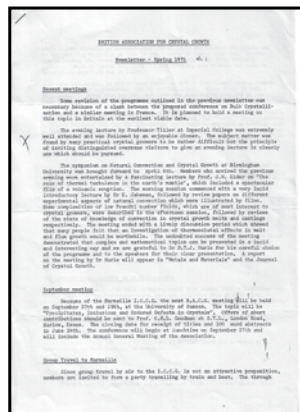
*Below – an early photograph of the Crystal Growth Group in the Clarendon Laboratory, at the University of Oxford.*



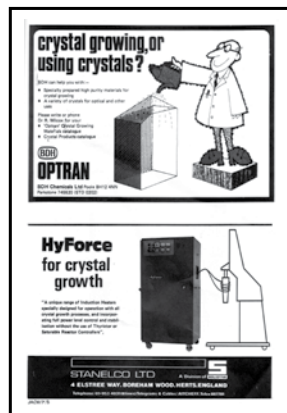
secondary school to university standard. Appendix E shows that these conferences have been held in 27 locations with University venues being most frequent. Lancaster was visited on five occasions during the decade 1970–1980 due, most would agree, to the excellent local hospitality and to the high standards of accommodation on offer.

BACG has always sought to provide a warm and friendly reception for the delegates attending its meetings and at its conferences. Consequently, the provision of facilities in the evenings for delegates to meet, to discuss and to attend further lectures on topics of common interest, is a matter which has received detailed attention. These evening symposia commenced at the 1970 Bristol conference with lively "beer and blackboard" sessions. This established very clearly that BACG understood at least two definitions of the word Symposium, namely, the historic version meaning 'a drinking party' and the conventional alternative meaning 'a meeting for philosophic conversation'. The trend continued at subsequent conferences with wine-tasting or cheese and wine receptions until 1975 when, very appropriately in Edinburgh, a dissertation on vapour transport, disguised as a malt-whisky symposium, was introduced complete with lecture and tasting. This was so successful in fomenting (and possibly fermenting) communication between delegates and distilling new ideas that it made periodic returns to the conference programme, culminating in a visit to a real distillery at the Sixth International Summer School on Crystal Growth (ISSCG6). There have been several burning issues. In the first, at Lancaster in 1972, a fire in a room adjacent to the lecture theatre caused mass evacuation although, in true British tradition, nobody believed the fire alarms until the Programme Chairman appeared to point out that they were not decoys. On another occasion, in fact during the 3-day week in 1974 when mains electricity was in short supply from time-to-time, a DC-powered 'magic lantern' projector was used to show the slides at a one-day

## THE EVOLUTION OF A NEWSLETTER



The first newsletter (above left) was a few sheets of typed A4, photocopied and stapled together. In contrast, Issue number 3 (above right) had a header and even contained advertisements (right)! It also contained the results of the logo competition.



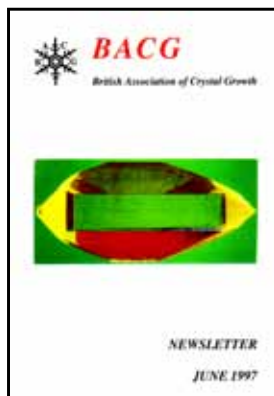
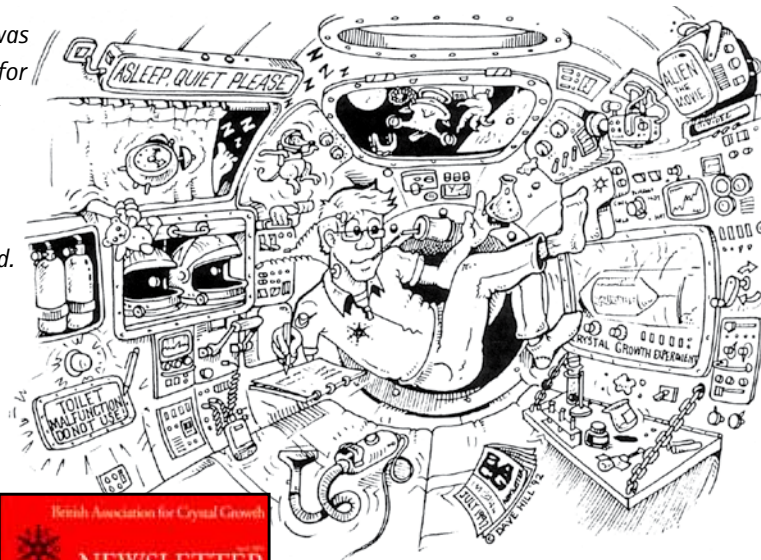
The issue from 1988 (right) saw the use of a real photograph on the cover printed in two colours, at a size of A4, and continued to feature some advertisements.







A strong visual identity was created in the new style for 1991, printed A4 in black with a secondary colour, varied for each issue. Some excellent cartoon illustrations also featured.

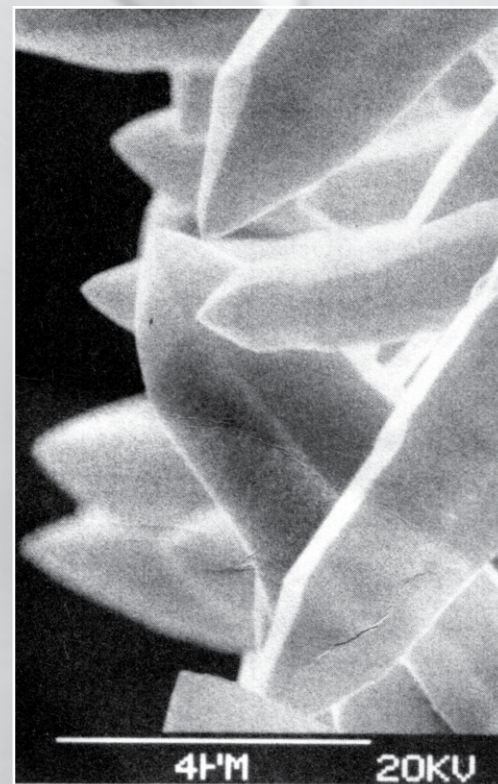


1997 (far left) saw simpler designs but featuring photographs from members' activities, whilst the latest incarnation from 2001 onwards has a black and orange design, size A5, and features photographs of people as well as research activities.

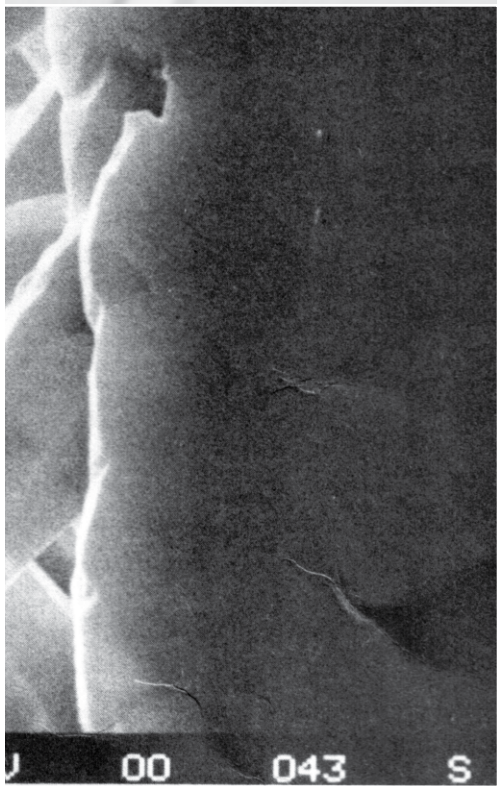
meeting in Birmingham. Unfortunately, the associated heat produced melting and flow in the film emulsion, so speakers and delegates had only a fleeting view of the slide content before the subject matter became an indeterminate splodge. Many in the audience found this somewhat amusing until several of them remembered that one invited speaker had borrowed their slides for his talk!

ICCG3 was held in Marseilles in 1971 at which the CICC presented a proposed Constitution for the formation of the International Organisation for Crystal Growth. This was accepted and the IOCG was born with BACG as one of the founding national associations with the others being from Belgium/France (later GFCC), the German Federal Republic (DGKK), Israel (IACG), Netherlands (KKN), Switzerland (SKM) and the USA (AACG). All national associations affiliated to IOCG can elect members to serve on IOCG council, the number of which is in proportion to the individual association's membership. BACG currently provides three council members, who are by current convention the Association's chair, secretary and treasurer. In addition to this, council members can stand for election to the IOCG executive committee and to date eight BACG members, as detailed in Appendix F, have served in this capacity.

The IOCG also awards prizes for distinguished contribution to the international crystal growth community and, so far, these (or their predecessors) been awarded four times to BACG members: Charles Frank, AACG 1st International Award in 1978; Don Hurle, AACG 4th International Award in 1987; Don Hurle, IOCG Frank Prize (awarded jointly with Sam Coriell) in 2001; and Brian Mullin, IOCG Laudise Prize in 2007.



*Photolytically grown CdTe crystallites randomly nucleated (after Chemtronics 2 (1987) 54.*



The IOCG also introduced an educational Summer School (later to become known as ISSCG1) which was to be held in conjunction with the international conference with the first being held in Noordwijkerhout in the Netherlands during the week prior to the ICCG3. This practice of school plus conference has continued up to the present day.

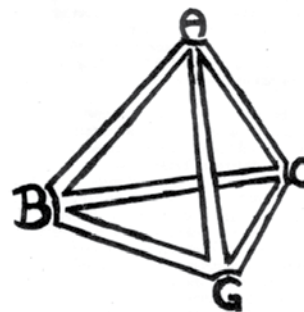
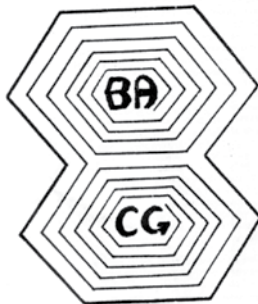
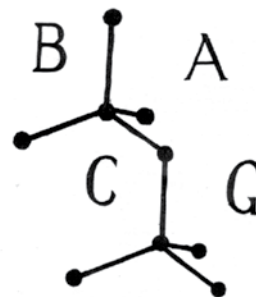
When BACG membership was small, the principal contact between the members and their elected Committee and Officers was, for the most part, face to face at the various meetings throughout each year. However, as the membership grew, the provision of a BACG Newsletter became both an essential medium for communication between those in post, in committee, and the members. Moreover, it was seen as a vehicle for conveying news on crystal growth, updating knowledge of developments, promoting events and acting in a more social role too. So it was that the BACG Newsletter was born in the Autumn of 1971, starting life as a few typed sheets and it had a precarious existence in various formats for its first decade and faced some difficulty in finding a regular editor.

With this awareness of improved communications came the feeling of identity with the Association beginning to feel like a real well established organization. But, as yet, the BACG did not have a recognizable visual identity, or logo. The idea of a 'crest' was first mooted in January 1972 (Minute 123) and a competition amongst members produced the current snowflake design. The final motif, designed by Mr N Taylor from the Fine Arts Department at Portsmouth Polytechnic, was accepted in February 1973 (Minute 164) and has been used continuously since then. The idea for a BACG tie was first discussed during the era of the second Chairman in 1972 but it was to be some 15 years later in 1987, under the eighth Chairman, when this story was eventually completed with the provision of two ties, one red and one blue, both bearing the BACG crest.

## THE SEARCH FOR IDENTITY - THE LOGO COMPETITION



**BACG**

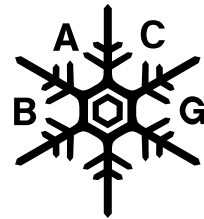


Some of the logo designs submitted in the competition to produce a BACG 'crest', as submitted in Newsletter No 3. The final snowflake gave the BACG a strong logo design, which has been used continuously since then.





*Top right - the BACG logo  
is largely unchanged  
from the original design*



**BACG** \_\_\_\_\_  
**British Association for Crystal Growth**  
 Registered Charity No.261780

ladies' scarf +

*Far right - the BACG  
tie and the ladies'  
neckerchief available  
in different colours*



*Near right - A  
commemorative glass  
paperweight was designed  
and produced for the  
BACG's 21st anniversary*



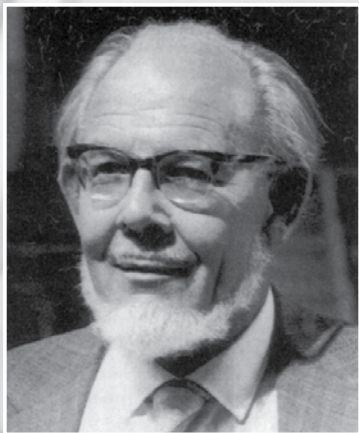
## **EXPANSION AND DEVELOPMENT OF THE ASSOCIATION THROUGH THE 1980S**

From 1980 the BACG Newsletter was to be issued on a much more regular basis becoming a professional, useful and interesting publication containing primarily crystal growth news within the UK and abroad, conference reports, crystal growth articles, a conference diary and membership news. Bristol, the site of the first Annual Conference, was revisited in 1981 to commemorate the 30th Anniversary of Frank's seminal BCF paper with many of the leading researchers of that time attending.

The BACG Annual Lecture, first introduced in 1978, was an attempt to raise the status of the former evening lecture into a more major event, and to attract a wider audience. However well intentioned, the difficulty in attracting sufficient numbers to attend, even in London, persisted. Hence, in 1980, this event was transformed into an important part of the Annual Conference where it has attracted, and continues to attract, generous support and participation and has achieved the status originally envisaged. The lecture titles and lecturers are compiled in Appendix E.

BACG continued to play a full part in organising international conferences, as detailed in the appendix. The experience base for this participation was quite naturally generated by ICCG2. Post-foundation and up to the present day the BACG has so far hosted some 18 International meetings, including the ECCG2 in Lancaster (1979), ICCG8 in York (1986) and ISSCG6 in Edinburgh (1986). In addition to these formal IOCG-related international meetings, BACG was also involved in the organization of a further 7 bilateral and trilateral meetings with other European crystal growth associations which became a regular feature





*Sir Charles Frank, OBE, FRS, a founder editor of the Journal of Crystal Growth. He was a great influence and friend to those who knew him, and his loss in 1998 was sad news indeed.*

of the BACG conference programme (1975, 1981, 1985, 1990, 1999, 2006 and 2007). An example of these meetings was the "Drei Landen" meeting organised in collaboration with the Dutch and German crystal growth associations held at Noordwijkerhout, Netherlands in 1981 to mark the 25th anniversary of Hartman and Perdok's paper on the Periodic Bond Chain theory of crystal morphology.

During the 1980s the Association promoted the development of crystal growth science, technology and engineering contributing greatly to the learned literature with members writing a range of papers for the scientific journals. The tri-annual international conference was usually published as a special volume of the Journal of Crystal Growth and this, together with the published proceedings of the ISSCG summer schools, formed a key scholarly resource for the community. BACG members were active in all aspects of this. Charles Frank was a founding editor of the Journal. Brian Mullin was, from its inception in 1967, an Associate Editor and remains so until this day. He has also edited many of the IOCG and other international conference proceedings published in the Journal. Don Hurle was a member of the Editorial Board from 25 years commencing in 1980 replacing Sir Charles Frank on his retirement. BACG members of the organising committees of both ICCG8 (York) and ECCG2 (Lancaster) edited the Proceedings of these two conferences. Members also wrote a number of key textbooks, which were influential in disseminating crystal growth science and technology globally, notably the three volume Handbook of Crystal Growth edited by Don Hurle.

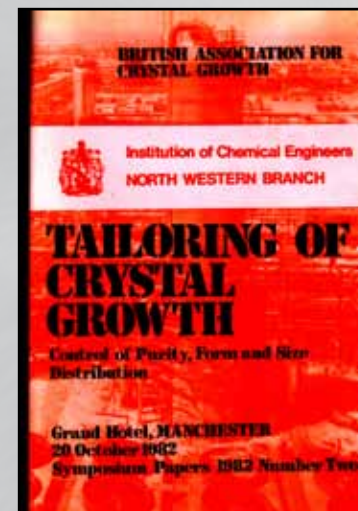
The educational role of BACG is one activity which has received continuous attention. The most responsive interactions have been provided by exhibitions, student sponsorship and the provision of lectures. The major touring exhibition for schools was a "Crystals

in Industry" exhibit, pioneered jointly with the Scottish Museums Council. This was presented in initial form at ICCG8 and in revised form as part of the "Crystal Pavilion" at The Glasgow Garden Festival in 1988, before touring many Scottish and some English schools during the subsequent two years. Student sponsorship to attend both national and international meetings relevant to crystal growth has been a common thrust which has helped many students to present their first paper in public.

Although the focus of the Association during the 1980s was mostly related to the fundamental and applied needs associated with the crystal growth of electronic materials, the area of industrial crystallization also played a significant, albeit more minor, role in the Association's activities. There was usually a member from this community on the BACG Committee, notably John Mullin, John Garside, Alan Jones, Mike Clift, Tony Scrutton, Roger Davey or Kevin Roberts. Through collaboration with the IChemE, several one day meetings were held throughout the 1970s and 1980s, most notably through the IChemE's North Western Branch, and included a meeting on "Tailoring of Crystal Growth Processes" in 1982 and the Annual Conference in 1989 which was held jointly with the Mineralogical Society and which included a session on "Mineralisation Processes".

Whatever other crises BACG has suffered in its 40 years, it has never suffered a financial one. This has been achieved notwithstanding the fact that, until 1987, the membership fee was only £1. In that year it was raised to £8, still a very modest figure at which it remains today. Its success has been largely the result of prudent selection of sponsorship of individual meetings of international conferences being held in the UK.

*Below - one of the many joint meetings held with the IChemE North Western Branch, this one from 1982.*







*Above - organiser of the International Summer School for 1986, Peter Drybrugh had many other interests, from jewellery and geology to collecting malt whiskies. He was Chairman in 1986.*

The real membership numbers each year have always been a matter for debate because the numbers registered on the dates when payments of subscriptions became due, were then paid, and at the end of the financial year of course differed. The appointment of a membership secretary brought this under some control and successive occupiers of this office have eventually ordered this information. However, the change in subscription caused a further rationalisation of these records, which is still ongoing.

The BACG's well established tradition for strong social programmes continued throughout the 1980s. The Bristol conference in 1980 provided an evening discourse on fortified wines, presented by a local firm of sherry importers. For ECCG2 at Lancaster, "A Lancashire Evening" was held specialising in local foods and ale.

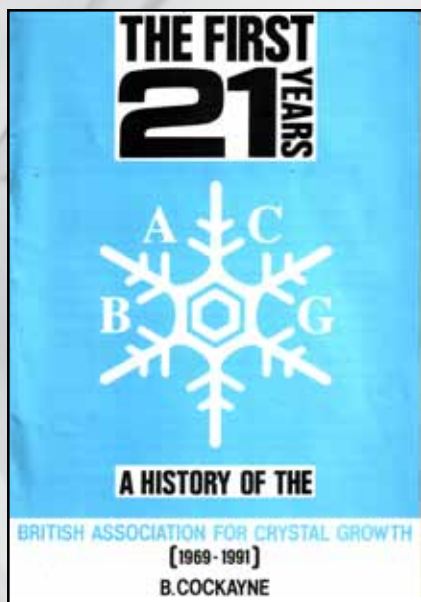
Three cities, Southampton (Annual Meeting in 1980), York (ICCG8 in 1986) and Birmingham (Annual Meeting in 1990), honoured the BACG by providing Civic Receptions for the delegates attending the annual conference. The visit to Chester in 1983 provided a double innovation by using hotel facilities (The Blossoms) for the first time and by holding a shortened conference over one weekend. Roger Davey presented an invited talk "Importance of Crystallisation in Controlling Physical Form of Bulk and Specialty Chemicals". The primary reason for this change was to avoid a clash between the annual national meeting and the triennial ICCG, being held in Stuttgart, Germany. It also allowed partners to accompany delegates in greater numbers. Similar reasoning prompted the weekend conference in Bath during 1986.

Evening entertainment associated with the Association's meetings has been quite varied also. Musical interludes have been provided by folk groups such as The Oldham Tinkers (ECCG2, Lancaster 1979), the Demon Barbers (Annual Conference, Brighton 1985), who devised a new work reporting upon the vicissitudes of life as a crystal grower, and a jazz ensemble (ICCG8, York, 1986). The pre-eminent musical event must be that which followed the silent and secret entry of the York Railway Institute Band into the engine turntable pit whilst delegates to ICCG8 were dining amongst the steam engines at the National Railway Museum, York. The sudden blast as the band opened their musical evening at full throttle certainly startled the diners.



*Above - guests of honour at the Civic Reception in Birmingham Council House to mark the BACG's 21st Anniversary in 1990.*

*Below – the predecessor to this publication, the history of the first 21 years of the BACG, written by Brian Cockayne.*



## CHALLENGES AND CHANGES FOR THE ASSOCIATION IN THE 1990s

The new decade started with a joint conference "Structural Aspects of Crystal Growth" organised by the Association in collaboration with the British Crystallographic Association (BCA) and the IChemE's Particle Technology Subject Group (PTSG) at the University of Exeter. It reflected a growing interest in the crystal growth of organic materials, notably from the pharmaceutical and fine chemical industries. The meeting led, in turn, to further meetings with the BCA as well as the BACG playing a leading role in setting up and running a new series of International Conferences on the Crystal Growth of Organic Materials (CGOM) starting with CGOM2 held at the University of Strathclyde in 1992.


BACG formally "came of age", later that year when it celebrated its 21st birthday at the 1990 annual conference held at the University of Birmingham's Manor House. The occasion was marked by an excellent and entertaining lecture "The First 21 Years: A History of BACG 1969-1990" given by IOCG President (and past BACG Chair) Brian Cockayne summarising the Association's history to date. A 21st anniversary souvenir paperweight sponsored by Royal Doulton Crystal was produced and another fine BACG annual lecture "Nucleation and Growth Kinetics of Macromolecular Biomaterials" was given by Rolland Boistelle (Marseille). Invited lectures from Klaus Ploog (Stuttgart) and Bob Feigelson (Stanford) and a civic reception hosted by the Lord Mayor in the Birmingham Civic Centre, together with a varied and stimulating conference programme, made this a most memorable annual meeting.

However, despite this excellent start to the decade, overall attendance at the BACG's annual conference had by then began to decline. To some degree, this reflected the shut-down or divestment of the crystal growth divisions of many of the major micro- and opto-electronics producers not just in the UK, but worldwide. In the UK most of the big names such as Plessey, Ferranti, GEC, Mullard and STC had disappeared or were soon to do so. However, against this, there was consolidation of core crystal growth activities through the amalgamation of Epitaxial Products International (a company formed by a core of ex-British Telecom and Plessey staff) and Wafer Technology (a bulk compound semiconductor crystal growth company with a long and chequered history dating back to the 1950s start-up company Metals Research) into the Cardiff-based international company IQE supplying custom III-V epitaxial materials.

Clearly, in this new and rapidly changing climate, BACG in its current guise could not realistically hope to have a significant long-term future unless it broadened its base to embrace the entire range of UK crystal growth activity. Its nadir was perhaps the 1993 Annual Conference at Bristol when an excellent scientific programme attracted an attendance of only 23 delegates. Following this, discussions, led by the then Chair, Don Hurle, with past Chairs together with an analysis of questionnaires returned from the membership raised the possibility of merging with another organisations such as the BCA. Others were against this feeling that it would be better to try to broaden BACG's base through strengthening the Association's involvement in the then rapidly growing area of industrial crystallisation. However, whilst there was a small core of members who rather strongly resisted such a broadening of activities, it was this direction rather than merger that the Association eventually chose to take.

*The Past President  
Bill Bardsley, President Frank  
Ainger and Chairman Don Hurle  
of the 1993 Conference.*





A strong and, in the end, compelling argument for retaining the Association's independent status was its representation on the IOCG. To sacrifice this would be to deprive the UK of influence in the development of the world community of over 20 affiliated national crystal growth organizations and, of course, of hosting IOCG meetings such as the triennial conferences and summer schools. It was finally decided that BACG should endeavour to remain independent, and to seek to embrace the whole spectrum of crystal growth activity within the UK and to promote more collaboration with appropriate organisations in the UK (e.g. BCA, SCI, RSC and IChemE) and with other crystal growth associations internationally. In addition to this, it was also perceived that several of the most important areas such as MBE and piezoelectric materials had started to spawn their own specialist groups not connected to BACG so it was agreed that attempts should be made to try and bring them into the fold.

To provide a better balance between the "electronic materials" and "chemical processing" arms of the Association it was decided to alternate the BACG Chair between representatives of these two communities with continuity of leadership being ensured through the election of the incoming Chair to a new Vice-chair post in the previous year. The BACG's Constitution of the Association was amended in 1994 to this effect.

John Sherwood was Chair in the 3 years from 1994 and he developed this new vision with enthusiasm and wisdom. The new culture was strongly reflected through the spirit and content of the 1994 annual conference held at the University of East Anglia and entitled "Crystallisation and Crystal Growth: An Interdisciplinary Perspective". The meeting also revived collaboration with the Dutch Crystal Growth Association and was a great success all round.



The review's achievements were clearly laid out in the "Chairman's Letter" in the June 1997 BACG Newsletter from which is quoted below.

*"A survey of interest of the members revealed that they could be classified into sub-groups reflecting the type of materials grown and examined:*

- 1) Semiconductor materials (mainly epitaxial growth)*
- 2) Oxide materials (high T<sub>c</sub>, ferro-electrics, ceramics)*
- 3) Optical materials (oxides, fluorides, organics)*
- 4) Chemical/biological materials (polymers, proteins, pharmaceuticals, fine chemicals etc)"*

Activity Groups were formed in each of these areas with a committee member as Chair. The Chairs were asked to develop a community to serve the interest of their members by:

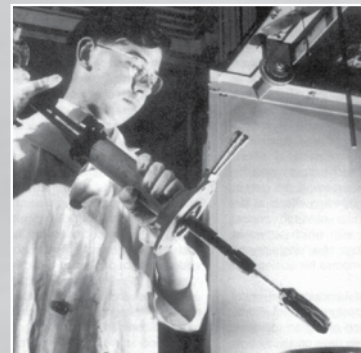
- Organising a session in this area at the AGM to attract members to the meeting.
- Arranging joint meetings with other organisations with parallel interests in crystal growth or to whose interests a wider knowledge of crystal growth might contribute. Such meetings have resulted in some excellent one-day meetings.
- Acting as a sponsoring link on behalf of the Committee for major international meetings when these are held in the UK.

The narrative concluded:

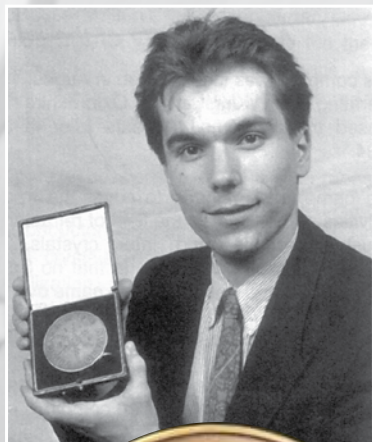
*"This is how the Committee sees its role developing in future years, balancing the existence of the sponsored specialist meeting which will always attract members, with the need to serve the community through the AGM ...*

*... The 'dissemination of information' aspect of this is in accord with the requirements for maintenance of charitable status by the Association."*

*Below - a young John Wilkes in his laboratory. Sadly, he died in 1995.*



*Below - Mark Yeadon was one of the early recipients of the BACG's Young Scientist Award in 1994.*



Another important innovation during this period was the introduction of the annual 'Young Scientist Award' ('Young' being defined as under 35 years of age) consisting of a £100 prize and a commemorative certificate and medal being awarded for "the most significant development in the theory or practice of crystal growth published in the literature in that year. The work should be based in the UK but the award is not limited to members of BACG". To date 15 awards (detailed in Appendix E) have been made to young researchers from a number of different universities.

Revisiting the subject of the historic "Faraday Discussions Number 5 on Crystal Growth" in 1949, the BACG was actively involved, in 1995, in organising, in collaboration with the RSC, Discussion Number 95 on "Crystal Growth", at the University of Strathclyde. The meeting and associated discussion highlighted the state-of-the art in crystal growth theory and practice. The final annual conference was held in 1999 at Robinson College at the University of Cambridge as part of the BACG's substantial involvement in CGOM5 which was held in conjunction with the 14th Symposium on Industrial Crystallisation (ISIC14).

During 1999 several improvements were made to the general organisation of the BACG through provision, for the first time, of professional support, initially provided by Haydn Hughes in the North East Wales Institute (NEWI) Conference Office, for the organisation of the Association's annual conference and the publication of the regular BACG Newsletters. The necessity for this reflects the fact that the Association's traditional source of organisational support which had been provided by the large companies and the universities was now less forthcoming.

At the same time the BACG created its own web-site (currently [www.bacg.org.uk](http://www.bacg.org.uk)), initially hosted as part of the NEWI website, for communication with members and as a means of keeping them in touch with events and with news of members.



Above - the current BACG web-site, a valuable resource for members.



Above - the 2001 BACG committee with Annual Lecturer Professor Bob Feigelson (above, 5th from left).

Right - the Community gained a second specialist Journal through the launch of *Crystal Growth and Design* (right) by the American Chemical Society in 2001.





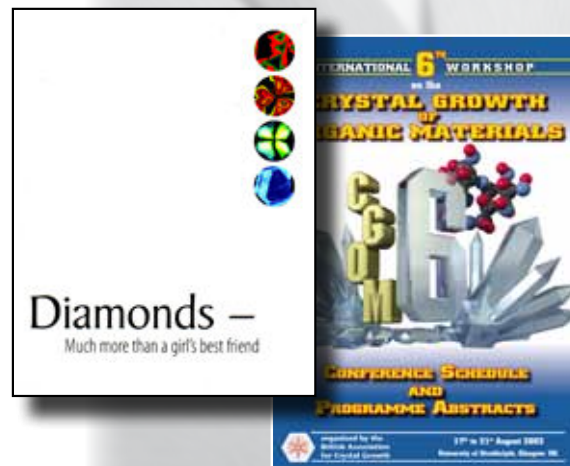
## THE ASSOCIATION IN THE NEW MILLENNIUM

With Stuart Irvine as the Association's Chair, the Millennium Annual Conference took place at UMIST under the title "The Past, Present and Future of Crystallisation". It was attended by approximately 80 members. It is a number that has been sustained and even improved upon a little up to the present showing that the Association is back again on a stable and secure footing. Rather than have a single BACG Annual Lecture for the Millennium Conference, it was decided to invite three overseas speakers having high international status. These were W Richter ("MOVPE"), H J Scheel ("Perfect Oxide Crystals and Epilayers") and A A Chernov ("Developments in Fundamental and Applied aspects of Crystallisation in the 20th century") chosen to match the two conference symposia: "Fundamentals of Crystal Growth and Crystal Growth from Solution" and "Semiconductors, Oxides and Optical Materials".

The 2001 Annual Conference at NEWI in Wrexham was memorable for its Symposium on Organic Crystal Growth and for Bob Feigelson's BACG Annual Lecture on "The Bridgman Growth of Oxide Crystals". It will be further remembered for all time by those who attended as the place where they learned about the terrible events in New York on 9/11. The year saw further international recognition for BACG researchers through the award of the IOCG's Frank Prize to Don Hurle (jointly with Sam Coriell of NIST, Maryland, USA) and also the launch, by the American Chemical Society, of a second specialist crystal growth journal "Crystal Growth and Design" with BACG members Roger Davey and Kevin Roberts on its editorial board.

The 2002 Annual Conference, organised by Linda Seton and Tim Joyce, was held at Liverpool University and evoked memories of past times having attracted around 100 members and having, as part of its social programme, that old BACG favourite, a Peter Dryburgh malt-whisky tasting session! Also in that year BACG formally invited the independent MBE working party to become the BACG Semiconductor Epitaxy sub-group, with Tim Joyce as its acting representative on the committee. This proposed union did not truly come into effect, although continued informal links contributed towards a successful, and profitable, international MBE conference in 2004. At the end of 2002 the committee set itself three further objectives: to increase the charitable aspect of its work by increasing funding for travel grants and sponsoring workshops, etc, to expand its industrial membership, and to improve its links with European crystal growth associations.

Regular dissemination of information to members is a key function of the Association. The more traditional medium – the Newsletter – remains very popular with members, if only because the postman is there to 'download' it for you, ensuring that you see it. Producing the newsletter is not a light burden and the history of the BACG Newsletter has been a chequered one. Peter Wright and Mike Astles did sterling service for a long period up to the early 1990s but when they retired there was a difficult period when it did not appear with any regularity. The situation was transformed for a while when Haydn Hughes and later Linda Seton took on the task and produced two editions per year up until 2005. Increasing difficulties in getting articles for publication coupled to the high cost of publication led to a decision to move to the modern idiom and provide all the newsletter materials and functions through the web site.



*Far left – the Conference Lecture at the 2003 Meeting held at University College Oxford was given by Moreton Moore.*

*Near left, and below – BACG also organised the CGOM6 meeting at the University of Strathclyde in 2003.*



In the Summer of 2003, The International Workshop on the Crystal Growth of Organic Materials (CGOM6) returned to the UK, and in particular to the University of Strathclyde in Glasgow, a location chosen to mark the retirement of former BACG Chair and President John Sherwood. Along with a strong turn out from the UK community, many leading international figures attended including Helmut Klapper (Aachen), Pieter Bennema (Nijmegen), Mike Ward (Minnesota), Kyo Sato (Hiroshima), Joachim Ulrich (Halle-Wittenberg), Meir Lehav (Weizmann Institute) and Alex McPherson (California Irvine). John presented a seminal retrospective lecture "Fifty Years as a Crystal Gazer (Life as an Imperfectionist)" on his research into growth and perfection of molecular materials. Delegates enjoyed a civic reception and conference dinner in the City Hall and a half-day excursion to Loch Lomond.

Attendance at the 2003 Annual Meeting at University College Oxford later that year was disappointing; approximately half that of the previous year, but there were consolations. The technical programme was greatly appreciated, especially Morton Moore's intriguingly entitled BACG Annual Lecture "Diamonds – More than a Girl's Best Friend". On the social side, the fact that the Chairman's team failed to identify any of the wines in the blind-testing evening was the source of much merriment, whilst one of the American guests turned out to be a star punter – on the Cherwell that is!

Following the disappointing turn-out for the Oxford meeting in 2003, the Annual Meeting was given a rework under the incoming BACG Chair, Kevin Roberts. Starting with the meeting at the University of Leeds in 2004, the scientific programme was enhanced via more international quality invited speakers, and the cost was reduced to a minimum, with subsidised fees for postgraduate students. By this time, the BACG had developed a

substantial budgetary surplus and it was felt that meetings could easily be held at a slight loss. At the same time, the conference organisation was transferred to Alison Whitely and her team at the University of Leeds' CPD office. Despite the best of intentions to spend some of the Association's surplus over this and the following meeting at the University of Sheffield (2005) both of these turned in a small surplus, each attracting delegate numbers in excess of one hundred.

The evolution of the membership of the BACG is difficult to trace since, for extended periods, there were no accurate records kept and there was no satisfactory regular pruning of names from the membership list as members moved on to new pastures. This high recorded membership allied to low membership revenue and low attendance at AGMs suggested that the organisation was perhaps top heavy with retired members. Under Membership Secretary Nigel Mason the list was 'spring-cleaned' to provide a more realistic list of around 200 members. Over the previous decade there had been a marked decline in the number of members from the government service, reflecting, in particular, the changes that have taken place at what was RSRE, Malvern – now Qinetiq. This decline was offset by a welcome growth in the academic membership, and a larger membership from the non-electronics sphere.

With Vice-Chair Tim Joyce assuming the Chair in the autumn of 2005 and with Bruce Joyce as then President, the interesting situation arose that the two principal Offices of the Association were filled by father and son. The following year saw two highly successful joint meetings. The BCA spring meeting at Lancaster was held as a joint meeting with BACG and two sessions were organised by BACG committee members: "Crystal Engineering" (organised by Nick Blagden); and "Crystal Structure and Growth



*Below – delegates at the 2005 Meeting held at the University of Sheffield.*







*Above - delegates at the 2004 Annual Meeting held at the University of Leeds.*



at the Nano-Scale" (organised by Kevin Roberts). The BACG annual conference, later that year, at Herriot-Watt University was again held in collaboration with the Dutch Crystal Growth Association providing yet another stimulating meeting. The following year the Association was again involved in organising another Faraday Discussion, this time Number 136 on "Crystal Growth and Nucleation", which was held at University College London and led by Nora de Leeuw.

Reflecting its charitable status, the BACG played an active part at this time in helping develop the crystal growth community in Eire with Brian Glennon from University College Dublin being co-opted on to the BACG committee. This led, in turn, to the setting up of an Irish Association for Crystal Growth (IACG) and the BACG holding its 2007 Annual Meeting in Dublin as a joint meeting with the IACG's inaugural conference. This was a most memorable event structured around three parallel symposia: "Pharmaceuticals", "Photonic materials" and "Protein Crystallisation". The last session, organised by Martin McCaffrey, was attended by more than a dozen leading members of the worldwide biological crystal science community and marked the life and work of the Irish crystallographer and sage J Desmond Bernal (1901-1971). Alex McPherson from the University of California Irvine gave the Annual Lecture with two further (and public) lectures being given by Nobel laureate James Watson from Cold Spring Harbour Laboratory and Bernal's biographer Andrew Brown from Harvard's Kennedy School of Government.

It is hoped that the Dublin venue will be the start of an on-going collaboration with the Irish crystal growers, an exemplar of which was the bid to host an IOCG triennial conference and the associated Summer School, (ICCG17 and ISSCG15) in Glasgow and Dublin, respectively, in 2013. The bid, delivered at ICCG15 in Salt Lake City, USA was

submitted as a collaborative effort by the British, Irish and Spanish associations but sadly it was not successful, the events being awarded to the Polish and German Crystal Growth Associations, respectively. However, all was not complete gloom at Salt Lake meeting as Brian Mullin's substantial and longstanding contributions to the crystal growth of III-V and II-VI compounds was recognised by his well-deserved award of the IOCG Laudise Prize.

The 2008 meeting was held at Loughborough University and comprised three sessions, "Pharmaceuticals and Fine Chemicals", "Crystal Growth of Nanoporous Materials", and a highly successful and novel session on "Nucleation and Crystallisation in the Atmosphere". Despite being the first of three high profile crystallisation meetings being held in two weeks (the others being BIWIC and the triennial ISIC) delegate numbers were still around 100. In the spirit of BACG informality, exhibitors at that meeting were each offered a 5 minute open platform in which to "sell" their products.

Before ending discussion of the BACG's progress into the first decade of the Millennium, mention needs to be made as to the fact that Past-president Bruce Joyce was elected a Fellow of the Royal Society in 2000 becoming the second FRS to be President of BACG, the first being Sir Charles Frank. BACG gained its third FRS President when Tom Foxon was elected in 2006. Having such eminent scientific figures as Presidents of the Association can only enhance its status in the eyes of the broader scientific community.



*Delegates at the 2006 meeting,  
Heriott-Watt University,  
Edinburgh, which was organised  
in collaboration with the Dutch  
Association for Crystal Growth.*



## **CLOSING REMARKS**

Crystal growth is at the base of the pyramid on which many high added-value products today are manufactured. Bill Pfann – of zone refining fame – once wrote that “behind almost every electronic device there stands a single crystal”. Today, the manufacturing base that depends on the fundamental understanding crystal growth and its associated technologies is very much wider with the discipline impacting on the preparation of advanced fine chemicals and pharmaceuticals and making its mark in very many new areas of scientific endeavour: nanotechnology, biomineralisation and protein engineering to name but three.

Globalisation has taken, and may continue to take, some manufacturing away from the UK to developing countries having much lower environmental and unit costs. However, it is only through the innovation of our scientists, technologists and engineers that we can counter this drift, a vision that perhaps provides the key to the UK’s continued industrial success. It is perhaps this aspect which provides both the challenge and opportunity for the Association, i.e. to exploit its key strengths in having academic crystal growth scientists, technologists and engineers working in close partnership with industry.

At the date of publication in 2009 the BACG will be celebrating 40 years of the art, science and engineering of crystal growth and it seems fitting to return to Bristol where the seminal Faraday Discussion on Crystal Growth was held in 1949 and where the first annual conference was held in 1970. Bristol was also home to Sir Charles Frank FRS, first president of the Association, who made major fundamental advances in the theoretical



understanding of crystal growth mechanisms. The university has also made significant contributions in other topics, notably the work of Andrew Keller on Polymer crystallisation and by Andrew Lang on X-ray determination of crystal defects.

The Association's history is neither static nor complete, because the BACG and its members' activities in both academia and industry will continue, into the foreseeable future, to deliver exciting science over the next 40 years.

As we take part in our 40th Anniversary Conference, we can raise a toast to an historical retrospective of the BACG, to be given by Don Hurle based on this publication.



*Above - Don Hurle together with BACG President Tom Foxon FRS (left) and Treasurer Tim Joyce (right).*



*Below - Members of the BACG Committee together with Nobel Laureate, James Watson - Brian Glennon, Ivan Marziano (left); Gerry Steele (right).*

*The BACG's 2007 Meeting was held in Dublin in collaboration with the newly formed Irish Association for Crystal Growth and incorporating a special session to mark the life and work of the Irish Crystallographer and Sage, J Desmond Bernal.*



*Above - Some of our members have diverse talents! Incoming 2009 BACG President Roger Davey is sings "Rocket Man" with the house band at the Conference Reception.*

## ACKNOWLEDGEMENTS

The authors would also like to thank current and previous members of the BACG for their active help in retaining and then recovering and supplying relevant data and/or comment from buried files, Minutes, Newsletters and memories associated with writing the original 21st anniversary history and this updated version which has been provided for the 40th anniversary. Most notably, we are grateful to Frank Ainger, Mike Astles, Bill Bardsley (deceased), John Brice (deceased), Roger Davey, Colin Goodman (deceased), Tim Joyce, Andrew Lang (deceased), Bernard Lunn, Ivan Marziano, John Mullin (deceased), Mike Quayle, Mike Sprackling, Brian Tanner, John Wilkes (deceased) and Peter Wright. That said, the responsibility for any errors and omissions, of course, lies with the authors.




## **APPENDIX A. BRIAN COCKAYNE (1936-2006): AN OBITUARY**

It is with great sadness that we record the death of Brian Cockayne, one of the leading figures in the history of BACG. Brian was an early and active committee member who went on to become Chairman during the period 1975-77. He promoted the influence of BACG in the international development of crystal growth as a research discipline. He served the IOCG first as a member of the Executive Committee from 1977 to 1983, then as its Vice President from 1983-89 and finally as its President from 1989 to 1992. During his period as President, by publishing regular newsletters in J. Crystal Growth, he fostered exchange between the affiliated national organisations. He did much to give UK crystal growth the international status that it enjoys today and worked tirelessly to build good working relationships with other crystal growers around the world. As a part of his commitment to BACG, he published a report of the history of its first 21 years and organised a commemorative meeting.

Brian's academic career began when he graduated from Birmingham University with a first class honours degree and a PhD in Physical Metallurgy. Later he was to receive a DSc from Birmingham and was appointed an Honorary Professor there. His close association with the University continued throughout his working life. He also collaborated over many years with the Optical Materials Research Centre at Strathclyde University and was a visiting professor there.

Having lectured at Birmingham University for a couple of years after completing his PhD, he moved to what was then the Royal Radar Establishment (now QinetiQ) at Malvern. His major and sustained scientific contribution was in the field of Czochralski growth





of high melting point oxide single-crystals, which were then in demand as laser host-lattice materials and as non-linear optical materials. A pioneer in the study of the defects that can occur during the growth and cooling of these materials, he devised refinements in the growth technique and growth strategies to optimise crystal perfection. His achievements were disseminated to the world in a large number of published papers and in invited review lectures. His national and international reputation grew rapidly and he became one of the youngest Individual Merit Scientists in the Civil Service. In 1990, his team and a team from Epichem jointly won the Queen's Award for Technology for the development of new chemical precursors for crystal growth. To both work and leisure he brought a combination of enthusiasm, leadership, an unquenchable sense of fun and, just occasionally, a bit of rebellion. He could be blunt and outspoken when annoyed but his infrequent admonishments to his research team were almost always understated. His characteristic reply to the news of yet another burned out platinum crucible was usually "I'd rather you hadn't done that, mate".

In 1996, he retired from crystal growth research and from the Civil Service with the rank of Deputy Chief Scientific Officer. His enquiring mind and love of life led him beyond his professional work into many other activities. In his younger days he was a keen squash player, later abandoning it in favour of golf. His love of wildlife and of the countryside led to a developing interest in landscape, geology, walking and ornithology. Typically, Brian's thirst for knowledge and his enthusiasm for his subjects made him a much sought-after speaker for clubs and societies, including RSPB, WI, Probus and others. Latterly, he devoted much of his energy and enthusiasm to the work of Worcestershire Wildlife Trust. (A memorial fund for the joint benefit of the Trust and the Society for Brain Tumour Research has been established). At home he was a devoted husband and

family man, whose untimely death has come as a devastating blow to Eileen, who cared for him with great devotion throughout his illness, and to their two children, Graeme and Shelagh.

A short resumé of his life and work cannot adequately reflect the immense contribution that he made to the Association and to the lives of all who had the pleasure of knowing and working with him. A true gentleman, he will be sadly missed.

Tony Vere, Don Hurle and Keith Barraclough, February 2006

## **APPENDIX B. HISTORICAL DOCUMENTS RELATED TO THE FORMATION OF THE BACG**

This provides the following documents:

- Crystal Growth Meeting of 18/12/68;
- Foundation Meeting on 25/06/69;
- The Association's Original 1969 Constitution;
- Minutes of the first BACG Committee Meeting on 24/07/69;
- Letter from the BACG's Secretary Dennis Elwell on 04/08/69 Announcing the BACG's Formation and Inviting Membership of the Association.



#### CRYSTAL GROWTH MEETINGS

A one-day meeting will be held on Wednesday, December 18th, 1968, in the Physics Department, Prince Consort Road, Imperial College, London. The subject will be:

#### CRYSTAL GROWTH - TRENDS AND SPECULATIONS

The programme will be as follows:

D.T.J. Hurle (R.R.E., Malvern).....Salt Growth  
E.A.D. White (Imperial College).....Solution Growth  
J.B. Mullin (R.R.E., Malvern).....Vapour Growth  
C.H.L. Goodman (S.T.L., Marlow)....."Problems with Crystals"

The scientific programme will be preceded by a business meeting at which the formation of a national crystal growth society will be discussed. The ICG organising committee are expected to make their recommendations to this meeting as requested by the British delegates at the Birmingham conference.

Coffee will be served at 10.30 a.m. and the meeting will start at 11.00 a.m.

If you wish to attend the meeting, please complete the reply slip and return to:

Dr. D. Elwell,  
Department of Physics,  
College of Technology,  
Park Road,  
Portsmouth,  
PO1 2DZ

#### CRYSTAL GROWTH MEETINGS

I wish to attend the meeting on December 18th

Name.....

Address.....

.....

.....

I wish/do not wish lunch to be provided

#### FOUNDATION MEETING OF BRITISH ASSOCIATION

#### FOR CRYSTAL GROWTH.

A joint business and scientific meeting will be held at

10.30 a.m. Wednesday 25th June 1969

in

Dept. of Chemical Engineering, Imperial College, London, S.W.7.

#### BUSINESS MEETING (11.00 a.m.)

Arising from the decisions taken at the meeting at Imperial College on 18th December 1968, the foundation committee elected at that meeting now proposes that a British Association for Crystal Growth should be formally created.

#### Agenda.

1. Adoption of a constitution for a British Association for Crystal Growth (see enclosed proposed constitution).
2. Foundation of the Association.
3. Election of a committee and auditors of the association under the terms of the adopted constitution.

#### SCIENTIFIC SESSION (Noon approx.)

#### RECENT DEVELOPMENTS IN THE APPRAISAL OF CRYSTAL PERFECTION

#### Programme.

1. "Mapping of Lattice Perfection by Multiple Bragg Reflections." Dr. M. Hart (Univ. of Bristol).
2. "Recent Advances in X-Ray Topography." Dr. A. R. Lang (Univ. of Bristol).
3. "Physical Assessment of Optical Crystals." Dr. B. Cockayne (R.R.E.).
4. "Physical Assessment of Thin-Film Devices." Dr. J.D. Filby (R.R.E.).

Requests for further information and comments relevant to the business meeting should be addressed to the Chairman of the Foundation Committee, Prof. A.D. McQuillan, Dept. of Physical Metallurgy and Science of Materials, University of Birmingham, P.O. Box 363, Birmingham, 15.



CONSTITUTION OF THE BRITISH  
ASSOCIATION FOR CRYSTAL GROWTH

1. NAME. The Association shall be called the British Association for Crystal Growth.
2. MANAGEMENT. The Association, its property and affairs shall be under the management and control of an elected Committee.
3. OBJECTS. The Association shall:
  - i) encourage scientific and technological communication and discussion of the theory and practice of the growth of crystals, industrial bulk crystallization and the appraisal of crystals,
  - ii) include in its field of interest all types of inorganic and organic crystalline materials including metals, ceramics, inorganic and organic compounds, polymers and electronic-device materials,
  - iii) be interdisciplinary in character, and represent crystal-growth activities in industry, research laboratories and establishments of higher education in the United Kingdom of Great Britain and Northern Ireland,
  - iv) undertake an educational role within its field of interest.
4. MEMBERSHIP. Applicants for membership shall be persons declaring themselves interested in crystal growth defined as above. Applications must be approved by the Committee, or by a majority of those members present and voting at the Annual General Meeting.
5. SUBSCRIPTION.
  - i) Each member shall pay an annual subscription of such sum as shall be fixed by the Association at the Annual General Meeting.
  - ii) The Committee shall have power to annul the membership of any member more than one year in arrears with his subscription upon giving fourteen days notice to his registered address, unless all arrears are paid before the expiration of such notice.
6. COMMITTEE.
  - i) The Committee shall consist of a Chairman, and nine other members of the Association.
  - ii) The Committee shall be broadly based, with no one field or discipline unduly favoured.
  - iii) The Committee shall elect an Honorary Secretary and an Honorary Treasurer from its number

- iv) The Committee shall be elected at the Annual General Meeting to serve for a term of three years. Arrangements shall be made for one third of the Committee to retire each year. No member of the Committee may be elected for two consecutive terms of office. The Chairman shall be elected annually at the Annual General Meeting, and shall not hold office for more than three consecutive years. Nominations for election to the Committee or to the office of Chairman must be received by the Secretary fourteen days before the Annual General Meeting, must be proposed and seconded by members of the Association, and must also be supported by evidence that the nominee is willing to serve.
  - v) The Committee shall have power to co-opt up to two additional members to its number during the year if it considers this to be conducive to the Objects of the Association.
  - vi) Five persons shall form a quorum at any meeting of the Committee.
7. THE TREASURER. The Treasurer shall have custody of all monies received on behalf of the Association, and such monies shall be paid into a banking account in the name of the Association. All disbursements shall be made by the Treasurer with the general authority of the Committee. Audited accounts shall be presented by the Treasurer at the Annual General Meeting.
8. AUDITORS. Two auditors, who shall not be members of the Committee, shall be elected annually at the Annual General Meeting. The auditors will examine and approve the Accounts before these are presented at the Annual General Meeting.
9. GENERAL MEETINGS. The date of the Annual General Meeting will be fixed by the Committee. A General Meeting can be called by the Committee at any time. An Extraordinary General Meeting shall be called by the Secretary when requested by at least twenty five members. A minimum of three weeks written notice of General Meetings must be given to members. Fifteen members will form a quorum at an Annual General Meeting or a General Meeting. Thirty members will form a quorum at an Extraordinary General Meeting.
10. ALTERATION OF CONSTITUTION AND RULES. The Constitution may be repealed, altered or added to by a resolution carried by a majority of those members present and voting at a General Meeting. Notice of any such resolution must be given in sufficient time for it to be included in the circulated agenda of the Meeting.

25th June, 1969.

BRITISH ASSOCIATION FOR CRYSTAL GROWTH

Minutes of Committee

The first meeting of Committee elected under the terms of the Constitution of the British Association for Crystal Growth was held at the Department of Electrical Engineering, Imperial College of Science and Technology, London on Thursday 24th July, 1969, at 10.30 a.m.

Present Dr. W. Bardsley, Mr. J. C. Brice, Dr. D. Elwell, Professor F. C. Frank, Professor A. D. McQuillan, Dr. J. B. Mullin, Mrs. B. Wanklyn, Dr. E. A. D. White.

Absent because of prior engagements

Professor C. H. L. Goodman, Mr. B. A. Joyce.

1. Election of Secretary and Treasurer

After proposal and seconding the following members of the Committee were elected unopposed.

Secretary - Dr. D. Elwell

Treasurer - Mr. J. C. Brice

2. Co-opted Members of the Committee

The Committee is empowered to co-opt up to two additional members. The fields of interest of Committee members were discussed and the preponderance of interest in the electronic - device - materials field noted.

- Resolved
- That a specialist in the field of industrial bulk crystallisation be invited to join the Committee.
  - That the Chairman contact Imperial Chemical Industries Ltd. with a view to obtaining names for consideration by the Committee for a co-opted member in the above field.
  - That if a National meeting on Crystal Growth be held by the Association, the second co-opted member may well be from the host institution.

3. Membership of the Association

Arrangements for enrollment of members were discussed.

- Resolved
- That the Secretary prepare a notice and an enrollment form, which, after the Chairman's approval, be circulated to all those on the circulation list of the Formation Meeting of the Association.
  - That the enrollment form request information on the name, position, organisation, address, telephone number, academic qualifications and fields of interest of the applicants.
  - That the Secretary acting on behalf of the Committee be empowered to approve applications for membership.



**Portsmouth College of Technology**

Principal : Dr. W. Davey, B.Sc., F.R.I.C.

DEPARTMENT OF PHYSICS

Park Road, Portsmouth, Hampshire. Telephone: Portsmouth 21371.

Head of Department: J.G. Scane, M.Sc., F.Inst.P.

4th August, 1969.

Dear Colleague,

British Association for Crystal Growth

The British Association for Crystal Growth was formed at a meeting at Imperial College on 25th June, 1969. The main purpose of the Association is to encourage discussion of the theory and practice of Crystal Growth.

At the inaugural meeting the following were elected as the first Committee: Professor A.D. McQuillan (Chairman), Dr. W. Bardsley, Mr. J.C. Brice, Dr. D. Elwell, Professor F.C. Frank, Professor C.K.L. Goodman, Dr. E.A. Joyce, Dr. J.B. Mullin, Mrs. B.M. Wanklyn and Dr. E.A.D. White. At the first meeting of this committee Dr. Elwell was elected Secretary and Mr. Brice was elected Treasurer. Proposals for a one-day meeting at Oxford in January and for a three-day conference in the summer of 1970 were discussed.

Applications are now invited for membership of the Association. If you wish to join, please complete the accompanying questionnaire and forward it with your subscription to the undersigned. The annual subscription of £1. 0s. 0d and the initial subscription will cover the period ending 31st July, 1970. Cheques should be made payable to the British Association for Crystal Growth and should be crossed.

Yours faithfully,

D. Elwell  
(Hon. Secretary)

## APPENDIX C. THE CURRENT BACG CONSTITUTION



### CONSTITUTION

#### 1. NAME

The Association shall be called the British Association for Crystal Growth.

#### 2. MANAGEMENT

The Association, its property and affairs shall be under the management and control of an elected Committee.

#### 3. OBJECTS

The Association shall

- (i) encourage scientific and technological communication and discussion of the theory and practice of the growth of crystals, industrial bulk crystallisation and the appraisal of crystals,
- (ii) include in its field of interest all types of inorganic, and organic crystalline materials including metals, ceramics, inorganic and organic compounds, polymers and electronic-device materials,
- (iii) be interdisciplinary in character, and represent crystal growth activities in industry, research laboratories and establishments of higher education in the United Kingdom of Great Britain and Northern Ireland,
- (iv) undertake an educational role within its field of interest.

#### 4. MEMBERSHIP

Applications for membership shall be persons declaring themselves interested in crystal growth defined as above. Applications must be approved by the Committee, or by a majority of those members present and voting at the Annual General Meeting.

## **5. SUBSCRIPTION**

- (i) Each member (except Honorary Life Members) shall pay an annual subscription of such sum as shall be fixed by the Association at the Annual General Meeting.
- (ii) The Committee shall have power to annul the membership of any member who is more than one year in arrears with his subscription upon giving fourteen days notice to his registered address, unless all arrears are paid before the expiration of such notice.
- (iii) At the discretion of the Committee, members who retire from full-time employment, and who have been active supporters of the activities of the Association, may be offered Honorary Life Membership of the Association, entitling them to all benefits of membership without payment of an annual subscription.

## **6. COMMITTEE**

- (i) The Committee shall be broadly based, with no one field or discipline unduly favoured.
- (ii) The Committee shall consist of a Chairman, nine other elected members of the Association and not more than two co-opted members. During alternate years it shall additionally elect a Vice-Chairman.
- (iii) The Committee shall elect from its number an Honorary Secretary, an Honorary Treasurer and such other Officers as are required.
- (iv) Election for new Committee Members shall occur at each Annual General Meeting. They shall be elected to serve for terms of up to three years but prior service for up to three years as Vice-Chairman/Chairman, Secretary or Treasurer shall not be counted as part of the elected term. However, no member may serve, in whatever capacity or capacities, for more than six years consecutively. (For the purposes of this section, a year is the period between Annual General Meetings). Election for the Vice-Chairman shall occur at alternate Annual General Meetings. The Vice-Chairman shall serve in that capacity for one year after which he/she will automatically become Chairman for the following two years. At least two Committee Members shall be elected at each Annual General Meeting. Nominations for election to the committee or for the offices of Chairman or Vice-Chairman must be received by the Secretary at least fourteen days before the Annual General Meeting. Each nomination must be signed by two members of the Association and must be accompanied by evidence that the nominee is willing to serve.
- (v) The Committee shall have power to co-opt up to two additional members to its number if it considers that this is conducive to the Objects of the Association.
- (vi) Five persons shall form a quorum at any meeting of the Committee. If a quorum cannot be obtained, executive action may be taken by the appropriate Officer provided that written approval is given by a majority of the members of the Committee.

- (vii) Any Officer or Member of the Committee can be removed, with immediate effect, from his/her position by the passage of a suitable motion presented to and passed by an Annual General Meeting. The motion must be received by the Secretary at least fourteen days before the Annual General Meeting and be signed by at least twelve members of the Association. In the event that the motion seeks to remove the Secretary from office, the motion must be submitted to the current Chairman.

#### **7. TREASURER**

The Treasurer shall have custody of all monies received on behalf of the Association, and such monies shall be paid into a banking account in the name of the Association. All disbursements shall be made by the Treasurer with the general authority of the Committee. Audited accounts shall be presented by the Treasurer at the Annual General meeting.

#### **8. AUDITORS**

Two auditors, who shall not be members of the Committee, shall be elected annually at the Annual General Meeting. The auditors will examine and approve the accounts before these are presented at the Annual General Meeting.

#### **9. NON-EXECUTIVE PRESIDENT**

The Association may appoint a non-executive President to hold office for up to five years. The Committee will recommend this appointment based on meritorious service to the Association. Such a recommendation shall be put to the full membership at the suitably convened General Meeting.

#### **10. GENERAL MEETINGS**

The date of the Annual General Meeting will be fixed by the Committee. A General Meeting can be called by the Committee at any time. An Extraordinary General Meeting shall be called by the Secretary when requested by at least twenty five members. A minimum number of three weeks written notice of General Meetings must be given to members. Fifteen members will form a quorum at an Annual General Meeting or a General Meeting. Thirty members will form a quorum at an Extraordinary General Meeting.

#### **11. ALTERATION OF CONSTITUTION AND RULES**

The Constitution may be repealed, altered or added to by a resolution carried by a majority of those members present and voting at a General Meeting. Notice of any such resolution must be given in sufficient time for it to be included in the circulated agenda of the Meeting.

## **STATUS OF THE ABOVE CONSTITUTION**

This Constitution incorporates the amendments to 5(i) and 5(iii) approved at the Annual General Meeting held at Hull University on 16th September 1987.

It also incorporates the amendments to 6(ii), 6(iv) and the insertion of 6(vii) approved at the Annual General Meeting held at the University of East Anglia, Norwich on 4th September 1994.

The purpose of the amendments to 6(ii) and 6(iv) is to provide overlap between consecutive Chairmen enabling the incoming Chairman to have planned for his term of office. It is anticipated, though not written into the Constitution, that consecutive Chairmen shall represent different areas within the overall field of crystal growth so that all 'chapters' of the Association will be represented with reasonable frequency.

Since the Vice-Chairman, once elected; does not have to seek re-election within a total three year term, the new clause 6 (vii) is designed to cover the contingency that, for whatever reason, he/she -or any other officer of the Association -fails to perform satisfactorily such a person can then be removed from office at an Annual General Meeting.

(Before these amendments were introduced the Constitution had been as approved at the Annual General Meeting held at Southampton University on 24th September, 1980)



## APPENDIX D. SUMMARY CHART DETAILING THE BAGG OFFICERS AND SOME OF THE KEY COMMITTEE MEMBERS

Honorary Presidents	Chairs	Secretaries	Treasurers	Membership Secretaries	Newsletter Editors
	A D McQuillan (University of Birmingham), 1969-1971	D Elwell (Portsmouth Polytechnic), 1969-1973	J C Brice (Philips, Redhill), 1969-1972	M Hart (University of Bristol), 1971-1975	L M Rouse (Imperial College London), 1972-1975
	W Bardsley (RSRE, Malvern), 1971-1973		C H L Goodman (STC, Harlow), 1972-1975	P Lilley (University of Manchester), 1975-1977	
	E A D White (Imperial College, London), 1973-1975	F W Ainger (Plessey, Caswell), 1973-1976	R F C Farrow (RSRE, Malvern), 1975-1977	J G Wilkes (Mullard, Southampton), 1977-1989	P Lilley (University of Manchester), 1975-1978
	B Cockayne (RSRE, Malvern), 1975-1977	D J Stirland (Plessey, Caswell), 1976-1977	K G Barraclough (RSRE, Malvern), 1977-1981		D Warne (Plessey, Caswell), 1978-1981
	J C Brice (Philips, Redhill), 1977-1979	D V Keight (ICI, Runcorn), 1977-1981	B W Straughan (RSRE, Malvern), 1981-1982		
Sir Charles Frank FRS, 1981-1986	F W Ainger (Plessey, Caswell), 1979-1982	I J Saunders (Lancaster University), 1981-1983	M G Astles (RSRE, Malvern), 1982-1985		F W Ainger/D J Stirland (Plessey, Caswell), 1981-1984
	K G Barraclough (RSRE, Malvern), 1982-1985	B Lunn (University of Hull), 1983-1985	S J C Irvine (RSRE, Malvern), 1985-1989		
W Bardsley, 1986-1991	I J Saunders (University of Lancaster), 1985-1988	M G Astles (RSRE, Malvern), 1985-1987	R C C Ward (University of Oxford), 1989-1992		MT Sprackling (Kings College London), 1984-1989
	P M Dryburgh (University of Edinburgh), 1988-1991	M J S Gyane (Johnson Matthey, Royston), 1987-1988			

<b>Honorary Presidents</b>	<b>Chairs</b>	<b>Secretaries</b>	<b>Treasurers</b>	<b>Membership Secretaries</b>	<b>Newsletter Editors</b>
F W Ainger, 1991-1997	D T J Hurle (University of Bristol), 1991-1994	P J Wright (RSRE, Malvern), 1988-1991	S J Barnett (DERA, Malvern), 1992-1996	P M Dryburgh (University of Edinburgh), 1989-1992	P J Wright/M G Astles, (RSRE, Malvern), 1989-1996
	J N Sherwood (University of Strathclyde), 1994-1997	S E B Gould (University of Edinburgh), 1991-1994			G Simpson (University of Strathclyde), 1996-2000
D T J Hurle, 1997-2000	R J Davey (UMIST), 1997-1999	P Capper (GEC-Marconi), 1994-2002	H G Gallagher (University of Strathclyde), 1996-2001	I J Saunders (University of Lancaster), 1992-2002	H Hughes (NEWI, Wrexham), 2000-2004
J N Sherwood, 2000-2003	S J Irvine (University of Bangor), 1999-2001		T B Joyce (University of Liverpool), 2001-2005		
	A W Vere (Crystal Consortium, Glasgow), 2001-2003	P J Halfpenny (University of Strathclyde), 2002-2004			
B A Joyce FRS, 2003-2006	K J Roberts (Leeds University), 2003-2005	G Steele (AstraZeneca, Charnwood), 2004-2007		N Mason (Kamelian, Oxford), 2003-2008	L Seton (Liverpool John Moores University), 2004-
C T Foxon FRS, 2006-2009	T B Joyce (University of Liverpool), 2005-2007		C Maxey (SELEX Sensors and Airborne Systems), 2005-2008		
	I Marziano (Pfizer, Sandwich), 2007-2009	M J Quayle (AstraZeneca, Avlon), 2007-	T B Joyce (University of Liverpool), 2008-	R B Hammond (University of Leeds), 2008-	
R J Davey, 2009-	N de Leeuw (University College London), 2009-				

## APPENDIX E. AN OVERVIEW OF BACG CONFERENCE ACTIVITIES INCLUDING DETAILS OF THE BACG ANNUAL LECTURE, BACG YOUNG SCIENTIST AWARD AND ASSOCIATED COMMENTS

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1968	15-19 Jul, Second International Conference on Crystal Growth (ICCG2), University of Birmingham			Proposal to form a national crystal growth association resulted from this meeting
1968	18 Dec, "Crystal Growth – Trends and Speculations", Imperial College London (one day meeting)			Meeting organised after ICCG2 with the aim to set-up a national crystal growth association in the UK
1969	25 July, Foundation Meeting "Recent Developments in the Appraisal of Crystal Perfection", Imperial College, London (one day meeting)			Meeting to found the association, approve its constitution and elect its committee
1970	9 Jan, "Solution Growth", Oxford (one day meeting)			
	8-11 Sep, Annual Conference, University of Bristol			
1971	27 Jan, "Constitutional Supercooling" (WA Tiller) Imperial College (lecture)			
	5-6 Apr, "Natural Convection and Crystal Growth", Birmingham			
	28-29 Sep, "Precipitates and Inclusions in Crystals", University of Sussex, Brighton			AGM held during this meeting
1972	19 Jan "Nucleation and Thin Film Growth" (J A Venables), Imperial College London, (evening lecture)			
	13-14 Apr, "Industrial Crystallisation", University College London			

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1972	17 Apr, "New methods for In-situ Studies of Thin Film Growth" (J R Arthur), Imperial College London (evening lecture)			
	24-27 Sept, Annual Conference, University of Lancaster			
1973	8-9 Jan, "Analytical Techniques for Crystal Characterisation", University of Oxford			
	22 Feb, "Crystallisation of Ice", (J Glenn), Imperial College London, (lecture)			
	6 Jul, "Looking into Diamonds" (A R Lang), Imperial College (lecture)			
	5-7 Sep, "Magnetic Bubbles", Imperial College			
	17-19 Sep, Annual Conference, University of York			
	Nov, "Crystallisation of Ceramics" (J White), University of Birmingham (evening lecture)			
1974	7-8 Jan, "Design of Crystal Growth Apparatus", Birmingham			
	21 Mar, "Photography and Crystal Growth", (S Speel), Imperial College London (evening lecture)			
	22-25 Sep, Annual Conference, University of Lancaster			
1975	3 Jan, "Transport and Thermodynamic Effects in Crystal Growth", Imperial College London (one day meeting)			
	26 Feb, "Rapid and Accurate Orientation of Crystals", (M Hart), Imperial College London (evening lecture)			
	24-27 Aug, Annual Conference, University of Edinburgh			Held jointly with Swiss Crystal Growth Association

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1976	9 Jan, "Defects in III-V Compounds", University of Manchester (half-day meeting)			
	25 Mar "Crystals for Optical Devices", University College London (one-day meeting)			
	5 Nov, Clarendon Laboratory visit including lectures on "Magnetic Materials"			
1977	5-7 Jan, Annual Conference, University of Lancaster,			Postponed from Sep 1976 to avoid clash with ECCG1
	5 Apr, "Silicon", Imperial College London (one-day meeting)			
	21-23 Sep, Annual Conference, University of Manchester			Held jointly with Dutch Crystal Growth Association
1978	13 Apr, "Crystal Growth and Characterisation of II-VI Compounds", University of Birmingham (one-day meeting)			
	6-8 Sep, Annual Conference, University of Reading			
	13 Dec, "Preparation and Assessment of Semiconductors" (one-day meeting), Imperial College London	Do Point Defects Exist in Glass? (N F Mott)		Held jointly with IoP
1979	10-15 Sep, ECCG-2, University of Lancaster			Also formed the BACG Annual Conference
	12 Nov, Annual Lecture, University College London	The Dynamical Behaviour of Tri-dimensional Epitaxial Crystallites (R Kern)		
1980	25 Mar, "Secondary Nucleation" University College London (one-day meeting)			

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1980	14-16 Apr, "Crystal Growth and Characterisation of II-VI Compounds", University of Lancaster			
	23-26 Sep, Annual Conference, University of Southampton	Zone Purification (W G Pfann)		
1981	6-8 May, "Drie Landen Conferentie", Nordwijkerhout, Holland			Held jointly with the Dutch and German Crystal Growth Associations
	21-24 Sep, Annual Conference, University of Bristol	New Developments in Spiral Growth Theory (P Bennema)		
1982	22-24 Sep, Annual Conference including a Symposium on "OMCVD of III-V Compounds and Alloys", University of Oxford	The Crystalline State of Microelectronics (D H Roberts)		Held jointly with IoP
	1st International Conference on II-VI Compounds (II-VI-82), University of Durham			
	20 Oct, "Tailoring of Crystal Growth- Control of Purity, Form, Size and Distribution", Manchester (one-day meeting)			Held jointly with IChemE
1983	21-23 Oct, Annual Conference, Blossoms Hotel, Chester	False Diamonds (J Wencus)		Weekend Conference
1984	10-12 Apr, IC-MOVPE-II, University of Sheffield including Symposium on III-V Heterojunctions			
	19-21 Sep, Annual Conference, University of Lancaster	The Race for the Fifth Generation (B W Oakley)		
1985	7 May, "Crystal Habit Modification, Control and Subsequent Effects", Manchester (one-day meeting)			Held jointly with IChemE



Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1985	9 Jul, 1st Photochemical Processing Workshop, University of Cambridge (one-day meeting)			
	24-27 Sep, Annual Conference, University of Sussex, Brighton	Nucleation of Ice Crystals (F Franks)		Held jointly with German Crystal Growth Association
1986	5-12 Jul, ISSCG-6, University of Edinburgh			
	13-18 Jul, ICCG-8, University of York			
	15-18 Sep, 4 <sup>th</sup> International Conference on MBE, University of York			
	24-26 Oct, Annual Conference, Royal York Hotel, Bath	Liquid Crystals, Useful and Beautiful (G W Gray)		Weekend Conference
1987	15-18 Sep, Annual Conference, University of Hull	Crystal Growth Experiments in Space (D T J Hurle)		
1988	20-23 Sep, Annual Conference, University of Strathclyde	Crystals and the Origin of Life (A G Cairns-Smith)		
	2 <sup>nd</sup> European Workshop on MOVPE, University of St. Andrews			
1989	20-21 Apr, 4 <sup>th</sup> Photochemical Processing Workshop, University College London			
	12-15 Sep, Annual Conference, University of Cardiff	Kinetic Controls in Crystal Growth in Silicate Melts: Implications for the Interpretation of Textures in Igneous Rocks (G Lofgren)		Held jointly with the Mineralogical Society.

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1990	28-30 Mar, 5 <sup>th</sup> Photochemical Processing Workshop, University College London			Held jointly with EMRS, EEC, IoP and RSC
	18-21 Sep, Annual Conference, University of Birmingham	Nucleation and Growth Kinetics of Macromolecular Biomaterials (R Boistelle)		
1991	1-5 Sep, 3 <sup>rd</sup> International Conference on Chemical Beam Epitaxy and related Growth Techniques, University of Oxford			
	16-17 Sep, Workshop on Growth, Perfection and Characterisation of Optically Non-Linear Materials, University of Strathclyde, Glasgow			Held jointly with SERC
	17-19 Sep, Annual Conference, University of Durham			
1992	19-23 Jul, International Conference on Narrow Gap Semiconductors, University of Southampton			
	7-11 Sep, 2 <sup>nd</sup> International Workshop on Crystal Growth of Organic Materials (CGOM2), University of Strathclyde, Glasgow			
	15-17 Sep, Annual Conference including Symposium on Diamond, Royal Holloway College London, Egham			
1993	14-16 Apr, Faraday Discussion Number 95 "Crystal Growth", University of Strathclyde, Glasgow			Held jointly with Faraday Division of the Royal Society of Chemistry

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1993	19-22 Sep, Annual Conference and 4 <sup>th</sup> International Conference on Purification of Materials for Crystal Growth and Processing, University of Bristol	Crystal Growth Since 1949: Achievements and Perspectives. (A A Chernov)		
1994	4-6 Sep, Annual Conference "Crystallisation and Crystal Growth: An Interdisciplinary Perspective", University of East Anglia, Norwich		Mark Yeadon (Birmingham University)	Held jointly with the Dutch Crystal Growth Association
1995	Jan, Growth, Characterisation and Applications of III-V Materials Grown on Non-(001 Substrates, Imperial College London			
	27-31 Mar, Annual Conference, University of Cardiff	Recent Results on the Growth of Inorganic and Biological Materials in Space (H U Walter)	Mark Aindow (Birmingham University)	Held jointly with the British Crystallographic Association
	21 Sep, Morphology, Surface Interactions and Control of Crystal Growth, Burlington House, London			Held jointly with Mineralogical Society
1996	9-13 Jun, 8 <sup>th</sup> International MOVPE Conference, Cardiff International Arena			
	9-10 Sep, Annual Conference "Growth of Optical Materials and Thin Film Oxides", University of Birmingham	Oxides for Industry (F W Ainger)	Tin Cheng (Nottingham)	
1997	21-23 Sep, Annual Conference, University of York	New Developments in Theories on Crystal Morphology (P Bennema)	Nicholas Blagden (UMIST)	Held jointly with Dutch Crystal Growth Association

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
1998	Jun, EXMATEC (University of Cardiff)			
	6-8 Sep, Annual Conference, North East Wales Institute, Wrexham	An Anecdotal Account of the Life and Work of Professor Sir Charles Frank (D T J Hurle)	Mashud Ahmed (NEWI)	
2001	1-2 Dec, "Polymorphism in Molecular Crystals: 100 years of Oswald's Rule", University of Manchester			
1999	6-10 Apr, 9 <sup>th</sup> European MBE Workshop, University of Oxford			
	15-17 Mar, Joint Bri-D-Ge meeting, Zeist, The Netherlands			Held jointly with Dutch and German Crystal Growth Associations
	12-16 Sep, 14th International Symposium on Industrial Crystallisation incorporating 5 <sup>th</sup> International Workshop on Crystal Growth of Organic Materials (CGOM5), Robinson College Cambridge			
	16-17 Sep, Annual Conference, Robinson College Cambridge	The Stresses and Strains of Crystal Growth (J N Sherwood)	Papa Kofi Boateng (King's College London)	

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
2000	17-19 Sep, Annual Conference "The Past, Present and Future of Crystallisation", UMIST, Manchester	Three Millennium Lectures: Major Developments in Crystallisation in the 20th Century (A A Chernov); Perfect Oxide Crystals and Epilayers for Optical Applications (H J Scheel); MOVPE: From Alchemy to Atomically Controlled Epitaxy (W Richerter)	Jonathan Hayes (Bristol University)	
	4 <sup>th</sup> European GaN Workshop University of Nottingham			
2000	1 <sup>st</sup> International Workshop on Physical Characterisation of Pharmaceutical Solids, University of Lancaster			
2001	10-13 Jun, 9 <sup>th</sup> European Workshop- MOVPE IX NEWI, Wrexham			
	10-12 Sep, Annual Conference, North East Wales Institute, Wrexham	The Growth of Oxide Crystals by the Bridgman Method (R Feigelson)	Carolyn Koh (King's College, London)	
2002	8-10 Sep, Annual Conference, University of Liverpool	Controlling Crystal Growth Processes of Biologically Soft Materials (K Sata)		
2003	17-21 Aug, 6 <sup>th</sup> International Workshop on the Crystal Growth of Organic Materials (CGOM6), University of Strathclyde, Glasgow			The meeting marked the retirement of former BACG Chair and President John Sherwood

Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
	7-9 Sep, Annual Conference, University College Oxford	Diamond: Much More than a Girl's Best Friend (A M Moore)	Jointly awarded to Heidi Groen and Patricia Mougin (Heriot Watt University, Edinburgh)	
	21-23 Sep, "55 Years of Ferroelectrics", University of Leeds			
2004	22-27 Aug, 13 <sup>th</sup> International Conference on MBE, Heriot-Watt University, Edinburgh			Held Jointly with the Institute for Materials Research, University of Leeds
	5-7 Sep, Annual Conference, University of Leeds	Crystallisation of Block Copolymers (A J Ryan)	Chun Min Chew (University of Sheffield)	
2005	27 Aug-3 Sep, International Summer School "New Advances in Crystal Growth and Nucleation", Il Ciocco Conference Centre, Lucca, Italy			Held jointly with the EPSRC's UK Network for Crystal Growth and Nucleation
	4-6 Sep, Annual Conference, University of Sheffield	Polymer Semiconductor Electronics - Electrons, Excitons and Interfaces (R Friend)	Fabien Silly (University of Oxford)	
2006	6-10 Apr, BCA Spring Meeting, Lancaster			BACG sponsored joint sessions on Crystal Engineering & Crystal Structure & Growth at the Nano Scale



Year	Details of Meeting or Conference	Annual Lecture	Young Scientist Award	Comments
2006	9-12 Sep, Annual Conference, Heriot-Watt University, Edinburgh	Salt Production Technology (J Meijer)	Michelle A. Moram (University of Cambridge)	Held jointly with the Dutch Association for Crystal Growth
2007	2-4 Apr, Faraday Discussion Number 136 "Crystal Growth and Nucleation", University College London			Held jointly with Faraday Division of the Royal Society of Chemistry
	2-4 Sep, Annual Conference, University College Dublin, including Bernal Symposium University College Dublin	In addition to the Annual lecture: Macromolecular Crystallization; Something Old, Something New (A McPherson), two further public lectures were given to mark the life and work of J Desmond Bernal: Rules for Doing High-level Science (James Watson); and Bernal in History (Andrew Brown)	Catherine E. Nicholson (Durham University)	Held jointly with the Irish Association for Crystal Growth
2008	7-9 Sep, University of Loughborough	Order Out of Chaos, The Amazing World of Crystals in Food (M Povey)	Ben Murray (University of Leeds)	
2009	6-8 Sep, Annual Conference, University of Bristol	Crystal Skulls: The Growth of an Industry (M Sax)	Andrew Bond (University of Southern Denmark)	
	9 Sep, Computational Pharmaceuticals Workshop, University of Bristol (one day meeting)			

## APPENDIX F. ELECTION OF BACG MEMBERS TO THE INTERNATIONAL ORGANISATION FOR CRYSTAL GROWTH (IOCG)

1971-1974	F C Frank	President, also President CICC (1968-71)
	W Bardsley	Past Chairman ICCG-2, also President CICC(1966-68)
1974-1977	F C Frank	President
	J B Mullin	Executive committee
1977-1980	F C Frank	Past President
	B Cockayne	Executive Committee
1983-1986	B Cockayne	Vice-President
	F W Ainger	Chairman ICCG-8
1986-1989	B Cockayne	Vice President
	F W Ainger	Past Chairman ICCG-8
1989-1992	B Cockayne	President
	D T J Hurle	Executive Committee
1992-1995	B Cockayne	President
	D T J Hurle	Executive Committee
1995-1998	B Cockayne	Past President
	J N Sherwood	Executive Committee
1998-2001	B Cockayne	Past President
	J N Sherwood	Executive Committee
2001-2004	J N Sherwood	Executive Committee
2004-2007	J N Sherwood	Executive Committee
2007-2010	K J Roberts	Executive Committee









**BACG** —————  
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