

## COMMITTEE

<b>Chairman:</b>	<b>Prof A T Dronsfield</b> School of Education, Health and Sciences, University of Derby, Derby, DE22 1GB [e-mail A.Dronsfield@derby.ac.uk]
<b>Secretary:</b>	<b>Prof W P Griffith</b> Department of Chemistry, Imperial College, South Kensington, London, SW7 2AZ [e-mail w.griffith@ic.ac.uk]
<b>Treasurer;</b>	<b>Dr J A Hudson</b>
<b>Membership</b>	Graythwaite, Loweswater, Cockermouth,
<b>Secretary:</b>	Cumbria, CA13 0SU [e-mail johnhudson25@hotmail.com]
<b>Newsletter</b>	<b>Dr A Simmons</b>
<b>Editor</b>	Epsom Lodge, La Grande Route de St Jean, St John, Jersey, JE3 4FL [e-mail a.simmons@ucl.ac.uk]
<b>Newsletter</b>	<b>Dr G P Moss</b>
<b>Production &amp;</b>	School of Biological and Chemical Sciences,
<b>Distribution:</b>	Queen Mary University of London, Mile End Road, London E1 4NS [e-mail g.p.moss@qmul.ac.uk]
<b>Committee:</b>	<b>Prof J Betteridge</b> (Twickenham, Middlesex) <b>Dr N G Coley</b> (Open University) <b>Dr C J Cooksey</b> (Watford, Hertfordshire) <b>Prof E Homburg</b> (University of Maastricht) <b>Prof F James</b> (Royal Institution) <b>Dr D Leaback</b> (Biolink Technology) <b>Dr P J T Morris</b> (Science Museum) <b>Prof. J. W. Nicholson</b> (University of Greenwich) <b>Mr P N Reed</b> (Steensbridge, Herefordshire) <b>Dr V Quirke</b> (Oxford Brookes University) <b>Dr S Robinson</b> (Ham, Surrey) <b>Prof. H. Rzepa</b> (Imperial College) <b>Dr. A Sella</b> (University College) <b>Dr. G. Taylor</b> (University College) <a href="http://www.chem.qmul.ac.uk/rschg/">http://www.chem.qmul.ac.uk/rschg/</a> <a href="http://www.rsc.org/membership/networking/interestgroups/historical/index.asp">http://www.rsc.org/membership/networking/interestgroups/historical/index.asp</a>

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## From the Editor

Welcome to the summer 2011 RSCHG Newsletter, which marks thirty years since the first one was published in June 1981. Continuing one of the themes of the International Year of Chemistry and commemorating the hundred years since she won the Nobel Prize for Chemistry, much of this issue is devoted to Marie Curie. Bill Griffith has written about her discoveries, while Geoff and Marelene Rayner-Canham explore her image and its effect on our perceptions of her life and work. Geoff and Marelene have also contributed some further insights into Ida Freund, who appeared in the last newsletter, focussing on her fervent opposition to the teaching of domestic science to girls in the place of academic science. Bill Griffith has written a short review of book published by the Marie Curie Museum in Warsaw and additionally there is a report on the meeting organised by the Historical Group and the RSC Radiochemistry Group on Marie Curie and the History of Radiochemistry.

This issue also includes two other short essays: the first by Derry W. Jones on the remarkable life of the analytical chemist George Kakabadse and the second by Eric Banks on The Moissan-Stock-Emeléus connection. There are reports on the RSC National Historical Chemical Landmark Award at Unilever Port Sunlight Research and Development Laboratory and on the English Heritage Plaque to Sir William Ramsay. I would also like to draw readers' attention to the inclusion of a section on Members' Publications. If you have published an article or book that you think would be of interest to other Historical Group Members please let me know and I can include it in this section. As you can see from this issue, anything from the title details to a fuller summary is most welcome.

As mentioned in the last newsletter, 2011 saw the introduction of changes to the RSC's system of charging for group membership, something which has substantially increased our group's size. This will lead to changes in the way the newsletter is distributed and this is discussed further on the following pages. Finally I would like to thank everyone who has sent material for this newsletter, with particular thanks to the newsletter production team of Bill Griffith and Gerry Moss. If you would like to contribute items such as news, articles and book reviews to the newsletter please do contact me. The deadline for the next issue will be 15 December 2011. Please send your contributions to (a.simmons@ucl.ac.uk) as an attachment in Word or rich text format, or on CD-Rom (post to Epsom Lodge, La Grande Route de St Jean, St John, Jersey, JE3 4FL).

Anna Simmons  
University College London

## Royal Society of Chemistry Historical Group News

### Electronic Version of the Newsletter

As a result of the new RSC interest group membership arrangements which came into force in January this year, we now have 494 members as against the 319 which we had a year ago. This increase is of course very exciting for us, but the new financial arrangements introduced as a result of the changes mean that the income to us *per member* is significantly reduced. The cost of printing and posting two Newsletters per year is considerable, and is certain to rise. It is clear that we will be unable to continue to produce and post hard-copy Newsletters to all members.

At our committee meeting on March 8 we spent much time debating this problem. It was unanimously agreed that we will switch to online publication of the *Newsletter*. It may well be possible in future to, for example, carry colour material in an online version, something that we cannot do at present with hard copy because of the extra printing expenses for coloured material

***We propose that the January 2012 Newsletter will be the last that will be produced in hard-copy format and posted to all members. Members who would prefer to receive the hard copy version will still be able to do so BUT you will be asked, in the January issue, to OPT-IN to such an arrangement.***

Online publication, which would of course be free of charge to members, would not be *via* e-mail attachment but by web access, probably at

<http://www.chem.qmul.ac.uk/rschg/> and  
[www.rsc.org/membership/networking/interestgroups/historical/index.asp](http://www.rsc.org/membership/networking/interestgroups/historical/index.asp).

The present issue can be viewed online at the former URL: we'd like your comments on this. Some 80% of our membership is online at present, and those who are not will be able to access online versions at their local libraries. We will indicate by means of a mass emailing to Group members every time that a new edition of the Newsletter is available for downloading from these sites. It will thus be a matter of self-interest that Group members who have not yet registered a current email address with the RSC should do so as soon as possible: see

<https://members.rsc.org/Login.asp?GoNext=Subscription> for details.

At a straw vote at our AGM of 19 March 2010 (see *Newsletter* August 2010, pp. 3-6) most of those present indicated that they would prefer to receive online copies.

**This matter is urgent** and will be discussed at our AGM this year (on Wednesday 26 October at the *Environmental Chemistry: A Historical Perspective* meeting - see enclosed flyer).

In summary: we will continue to publish two Newsletters each year, one in the winter and another in the summer. These will be available by electronic (internet) access. Members who wish to continue receiving the paper copy version MUST register their wishes with the Secretary by **20 March 2012** at the latest. In the absence of such notification, the presumption is that members will be happy to access the Newsletters electronically and they will cease to receive hard-copy issues after January 2012.

#### **Depositing the RSC Historical Group Newsletter at the British Library**

The British Library has gratefully accepted a complete run of the *RSC Historical Group Newsletter* and of the six *RSC Historical Group Occasional Papers*. This follows a suggestion made to me by one of our new members, Dr Michael Jewess, that we approach the British Library suggesting such deposition of the Newsletter. The *Newsletter* started in June 1981 and there have been two issues a year since then (except for 1993 when there was only one, in July). The issues are now being catalogued at the British Library: when this process is complete I shall apply for a unique ISSN number. Copies of new issues will of course be sent to the Library on publication. The deposition of these copies in our national library should enhance its standing.

I am very much indebted to Ray Anderson, Bill Brock, Peter Morris, Gerry Moss and Colin Russell for donating copies or originals of the earlier issues, and again to Gerry who made A5 copies where these were needed for the Library.

The first thirteen issues were numbered (No. 1 was June 1981 and the last, No. 13, was July 1987. We are re-introducing this numbering scheme, so that the present issue (summer 2011) is No. 60.

Bill Griffith

#### **Royal Society of Chemistry Historical Group AGM**

The thirty sixth Annual General Meeting of the Group, to be held in the Chemistry Centre, Burlington House at 13.45 on Wednesday 26 October 2011.

##### **Agenda**

1. Apologies for Absence.

2. Minutes of AGM at Burlington House, Friday 19 March 2010.
3. Matters arising from the Minutes.
4. Reports:
  - Chairman's Report.
  - Secretary's Report.
  - Treasurer's Report.
5. Future Meetings.
6. Election of Officers and other Members of the Committee.
7. Any Other Business.
8. Date, time and place of next meeting.

#### **Minutes of AGM - 19 March 2010**

The 35<sup>th</sup> Annual General Meeting of the Group, held in the Council Chamber, at 13.45, on 19 March 2010.

**1. Apologies for Absence** were received from Colin Russell and Anna Simmons.

**2. Minutes of AGM** at Burlington House, Friday 20 March 2009. Distributed and approved.

**3. Matters arising from the Minutes.** No matters arising

##### **4. Reports:**

**Chairman's Report:** Alan Dronsfield said that the Group had had a good year and paid tribute to the Officers and members of the Committee for ensuring smooth running generally. The Group was perceived by the officers of the RSC to be one of the more active ones, and even with a £10 subscription, gave good value for money. The plan for RSC members to have 'free' subscriptions was getting closer and may even apply to 2011 subscriptions (i.e., the forthcoming renewals). There will be complications if our membership increases from hundreds to thousands, but we have been assured by the RSC that such a change will not financially embarrass us.

Those present today will have noticed the imposition of charges for tea and coffee. Because the Group continues to give much help to the RSC in handling 'historical' and other enquiries, we are not being charged for room hire (the full commercial rate for the Library for a day's conference is £940 + VAT). The Committee is taking an interest in this and although payment

for tea and coffee will now be a feature of Burlington House meetings, we hope at least for the foreseeable future, not to have to factor in any costs for the use of Burlington House premises.

**Secretary's Report:** Bill Griffith distributed his report for the year March 2009 - March 2010. This is given on p. 46 of the February 2010 *Newsletter*.

**Treasurer's Report:** John Hudson said that membership of the Group was up by fifty this year. He tabled the audited financial report for 2009. He noted the deficit for 2009 of £650: this arose from an outstanding bill to Queen Mary Westfield College for Newsletter publication and for expenses in connection with the Wheeler bequest. He was not unduly disturbed by the deficit as income from the RSC should be some £3,300 this year.

A proposal that the accounts be accepted was made by Jack Betteridge, seconded by Frank James and carried *nem. con.*

**5. Future Meetings:** Bill Griffith distributed this:

*The Rise and Fall of ICI* is the current meeting (Friday 19 March 2010); 120 attendees.

*The history of chemical information. Monday 29 November 2010.* Joint meeting with the Chemical Information Group (CICAG). Chris Cooksey is the RSCHG organiser.

*Marie Curie and the History of Radiochemistry.* A one-day meeting on Friday 18 March 2011, in the Chemistry Centre, organised by Alan Dronsfield and Bill Griffith.

One of our 2011 meetings is likely to be on an environmental topic.

**6. Election of Officers and other Members of the Committee:**

Alan said that members of the Committee were prepared to serve for another year. If any other members of the HG wished to serve on the committee they should have a word with Bill. He proposed that the committee serve for another year: proposed by Martyn Twigg seconded by Ray Anderson and carried *nem. con.*

Alan will have served for four years as Chairman by autumn 2010. He can serve for a further four years, subject to committee and AGM approval. HG members wishing to take over as Chairman, or who would like to see a change in the Chairmanship should send an e-mail to Bill (w.griffith@ic.ac.uk) who will set the election procedure in motion. Bill, however, by autumn 2010, will have served two four-year periods as Secretary and in theory should serve no longer, but at the recent Committee meeting, no-one was prepared to take over the post of secretary. If any member of the HG wished to take on the role, they should have a word with

Alan, who will set the election procedure in motion. The Committee felt, though, that if no volunteer was forthcoming, Bill should be asked to serve a further year, this time as 'Acting Secretary'. A proposal that, in the absence of volunteers to serve as HG Secretary, Bill Griffith be asked to serve for twelve months as 'Acting Secretary' was proposed by Alan Dronsfield, seconded by Eddie Abel, and carried *nem. con.*

**7. Any Other Business:**

Several members present expressed considerable satisfaction with our Newsletter and said that they looked forward to its twice yearly publication. Alan paid particular tribute to its editor, Viviane Quirke, and also to the 'production assistants' Bill Griffith and Gerry Moss. The printing of the Newsletters, and the associated postage, is at present our major expense. Fiona McMillan, our new RSC coordinator, has offered to place it on our RSC website. Alan called for a show of hands as to how many would like to receive an electronic copy; some 60% favoured this, but a sizeable minority (including the three Officers) would prefer to receive hard copy as at present.

**8. Date, time and place of next AGM:** 12.30, Friday 18 March 2011, as part of our Marie Curie meeting. (NB This date was subsequently changed – see above).

## January 2011 Newsletter – Feedback

From Geoff Rayner-Canham and Marelene Rayner-Canham, members of the RSCHG, who have published extensively on women in chemistry.

We were interested to read in the January 2011 issue of the account of Ida Freund's long-forgotten contributions to chemical education (1). Freund was a much-respected figure in her time, not only for her chemistry text-writing (2), and for her efforts to have the Chemical Society open its doors to women (3), but also for her fervent opposition to the teaching of domestic science to girls in place of academic science.

In the early part of the twentieth century, there were many scientists who contended that girls should be taught domestic science (and, in particular, domestic chemistry) as their school science component. Domestic science, it was claimed, would be of benefit to most girls as future wives and mothers, rather than academic science, which would enable just a few to proceed to university (4).

Freund played a leading role in the contrary camp. She objected to domestic science being taught as science in either schools or tertiary-level institutions

and, in 1911, authored a lengthy two-part denunciation in the feminist publication, *The Englishwoman* (5). She contended:

It was erroneous to think that through the study of the scientific processes underlying housecraft and especially cookery, you can teach science, that is, give a valuable mental training which should enable the pupils in after life to judge whether an alleged connection between effect and cause has been established or not.

An Editorial in the *Journal of Education* supported her position (6):

Miss Ida Freund has shown courage in attacking the movement that seeks to put the new study known as domestic science under academic control. ... Miss Freund thinks that the inevitable result of academizing domestic science would be to lower the standard of scientific work for women; and she scoffs a little at the idea of research work in schools on the subject. ... There is little precise knowledge as yet as to the chemistry of food, the science of ventilation, and a hundred kindred matters.

Even after her untimely death in May 1914, Freund's name was held in respect. In September 1914, Isabel C. Fortey wrote to the *Journal of Education* complaining about the review of a book authored by the domestic science advocate, Jessie White, titled *First Book of Experimental Science for Girls* (7). The review had opened with the statement: "To those who have studied the problem, it has for long been obvious that girls require a course in science quite different from that which it has been customary to provide for boys." Before giving her rebuttal, Fortey commenced: "Such a statement will not be allowed to pass unchallenged because Miss Freund is dead."

In her response to Fortey's criticism, White felt it necessary to claim the spiritual support of Freund on the issue (8):

I was fortunate enough to have the opportunity of talking to Miss Freund about science teaching, and, had the state of her health allowed of her reading my little book, she would, I feel, have approved of it. ... She was entirely opposed to science teaching being made ancillary to the teaching of the domestic arts. Well, so am I. But she also disliked a narrow science course unrelated to the phenomena which the environment of the pupil provides.

The teaching of domestic science in girls' schools continued through the first half of the twentieth century. Nevertheless, Freund's supporters ensured that academic science retained a central role at most girls' academic secondary schools. Thus Freund deserves to be remembered, too, for her role in contesting the validity of the domestic-science-as-science movement.

## References

1. M. Hill and A. Dronsfield, "Ida Freund – pioneer of women's education in chemistry," *Education in Chemistry*, 2004, **41**, 136-137; reprinted as M. Hill and A. Dronsfield, "Ida Freund, the first woman chemistry lecturer," *RSC Historical Group Newsletter*, 2011 (January), 14-20.
2. B. Palmer, "Ida Freund: Teacher, Educator, Feminist, and Chemistry Textbook Writer," <http://internetjournals.net/journals/tir/2007/July/Paper%2012.pdf>
3. M. Rayner-Canham and G. Rayner-Canham, *Chemistry was Their Life: Pioneer British Women Chemists, 1880-1949*, (Imperial College Press: London, 2008).
4. M. Rayner-Canham and G. Rayner-Canham, "The Rise and Fall of Domestic Chemistry in Higher Education in England during the early 20<sup>th</sup> Century," *Bull. Hist. Chem.*, 2011, **36**(1), 35-42.
5. I. Freund, "Domestic Science - A Protest," *The Englishwoman*, 1911, **10**, 147-163, 279-296.
6. Editor, "Occasional Notes: Domestic Science," *J. Educ.*, 1911, **33**, 451-452.
7. I.C. Fortey, "Letter to the Editor: Sexless Science," *J. Educ.*, 1914, **36**, 618, 620.
8. J. White, "Letter to the Editor: Science for Girls," *J. Educ.*, 1914, **36**, 698.

Marelene Rayner-Canham and Geoff Rayner-Canham

## Members' Publications

If you would like to contribute anything to this section please send details of your publications to the editor. In this issue we shall focus on a history of Staveley Chemicals Ltd by Ron Presswood, published in the *Journal of the North East Derbyshire Industrial Archaeology Society*, with brief details of some recent publications by Historical Group Committee Members.

### A History of Staveley Chemicals Ltd

Many members will remember that in earlier years, they had bought or used chemicals supplied by Staveley Chemicals Ltd. They may even remember the names of companies within or associated with the Staveley group such as Vinatex Ltd, Hartington Chemicals Ltd, Chipman Chemicals Ltd, Ringwood Chemicals Ltd and Phthalic Anhydride Chemicals Ltd.

Staveley Chemicals grew up and evolved with headquarters in Staveley, Derbyshire, an area rich in natural resources. It was these resources, and, in particular, coal and iron ore, which records show were being used on the site as far back as the seventeenth century. The Staveley forge and furnace was one of the earliest iron making sites in North East Derbyshire and was undoubtedly the forerunner of the subsequent continuous industrial activity at Staveley Works. Para-amino phenol, the pharmaceutical precursor for paracetamol, is still manufactured there today but is the last remnant of the once mighty Staveley Organisation.

Production expanded over the centuries, particularly with development of coal chemicals, and Staveley Chemicals came to prominence in the twentieth century. They became a major producer of aromatic and aliphatic solvents, phenolics for disinfectants, isocyanates, chlorine based chemicals, sulphuric acid, oleum and other inorganic acids – and at one time, they employed over 15,000 people within the wider group.

This historic site, with its links going back to the seventeenth century finally closed in 2007. Members will be pleased to know that the history of the company has been recorded by one of Staveley Chemicals' previous research chemists and RSCHG member, Ron Presswood; his history of the site takes us right back to the seventeenth century, and the account moves forward through significant developments and plant installations. Ron Presswood's article includes a comprehensive timeline from the early activities in 1605 to main closure in 2007. The article also includes fifty photographs of various parts of the plant mainly taken by another Staveley chemist, Ken Bale.

The article is published in the *Journal of the North East Derbyshire Industrial Archaeology Society*, ISSN 1752-3044, vol. 3, June 2010, 5–61, and can be obtained from Cliff Lea. A further article in the same edition recounts the history of one of Derbyshire's early oil companies, Silkolene, and touches on Britain's very first successful deep oil well of 1919.

For more information contact Cliff Lea: cliff@nedias.org.uk

Cliff Lea

### **Recent publications by Historical Group Committee Members**

“Discovering Iodine,” Alan Dronsfield, Pete Ellis and Pat Swain, *Education in Chemistry*, 2011 (June), **48**, 120-123. This is an account for the general reader of the discovery of iodine made in 1811 by Bernard Courtois. The article includes details of the nineteenth century medical applications of iodine consequent on its discovery.

“Forensic Science and the Case of Dr Mario Jascavevich,” Alan Dronsfield and Ann Ferguson, *Education in Chemistry*, 2011 (May), **48**, 84-86. This article recounts some recent history, that of the trial (and the scientific evidence that featured in it) of Mario Jascavevich for the murder of several of his patients with the relaxant drug, curare. It was written primarily for students of forensic science and their teachers.

“Radium, a Key Element in Early Cancer Treatment,” Alan Dronsfield and Pete Ellis, *Education in Chemistry*, 2011 (March), **48**, 56-59. Radiation from radium salts was used to ‘burn out’ cancers for well over sixty years, and was a useful alternative to the existing methods of treatment (X-ray therapy and surgery). This article reports on the application of radium in medicine essentially over the period 1900-1930 and concludes with a few examples of radium-based patent medicines of dubious efficacy marketed during this period.

“A Sinister Side to a Synthetic Sex Hormone,” Alan Dronsfield, Pete Ellis and Alan-Shaun Wilkinson, *Education in Chemistry*, 2011 (January), **48**, 16-20. A history of the discovery, synthesis and applications of the synthetic sex hormone diethylstilboestrol. The last includes details of some unfortunate applications which have left a legacy of cancer-risk to the users themselves and their daughters.

“The Medicinal History of Phosphorus,” Alan Dronsfield and Pete Ellis, *Education in Chemistry*, 2010 (September), **47**, 150-155. In the early Middle Ages physicians treated most illnesses (ineffectually) with herbs and plant extracts. Paracelsus (1493-1541) challenged this practice and suggested that inorganic chemical remedies might be better. Consequently, on its discovery, the element phosphorus was thought to have considerable medical potential. This article recounts its application to remedy a variety of complaints from male impotence to tuberculosis.

*Elements of Inspiration* (a tribute to Marie Curie), Bill Griffith, *Chemistry World*, 2011 (January), 42-45. Unerring in her scientific enquiry and not afraid of hard work, Marie Curie set a shining example for generations of scientists. This article explores her life and the award in December 1911 of the Nobel Prize for Chemistry, the first female recipient of any Nobel Prize and the first person ever to be awarded two.

*Four Curie Centennial Elements*, Bill Griffith, *Education in Chemistry*, 2011 (March), 52-55.

*Ruthenium Oxidation Complexes*, W.P. Griffith, (Springer: London, 2011) (258 p.).

“The Railway Chemists 1830-1923,” John Hudson, *Manchester Memoirs*, 2010, **147**, 42-52. From the very early days of railways, chemists were employed in the industry. Initially they worked as consultants, but from the mid-1860s the larger railway companies opened their own chemical laboratories and employed their own chemists on a full-time basis. This paper provides a brief overview of the activities of chemists in the railway industry up to 1923, when the myriad of railway companies then in existence were amalgamated into four large groups.

“History and Development of Alcoholic Beverages,” John Hudson, Chapter 1.2 (pp. 12-41) in vol. 1 of *Handbook of Alcoholic Beverages, Technical, Analytical and Nutritional Aspects*, A.J. Buglass (ed.), (Wiley: Chichester, 2011).

This so-called *Handbook* is a two-volume work of 1167 pages which gives a comprehensive description of the science and technology involved in the contemporary production and analysis of alcoholic beverages. John Hudson’s chapter provides an historical account of alcoholic beverage production and analysis. The treatment is inevitably brief, but reference is made to the work of many well-known scientists (e.g. Lavoisier, Liebig, Pasteur, Carlsberg, Sørensen, etc.), and the impact of the introduction of new technologies such as steam power and refrigeration is discussed. The analytical methods described range from those of the ale conner, who, wearing a pair of leather breeches, sat in a pool of ale on a wooden settle for half an hour to see if his breeches stuck to the settle, to site-specific natural isotopic fractionation NMR.

“Classic Kit.” This is Andrea Sella’s monthly column in *Chemistry World*.

A collection of his columns can be found at:

<http://solarsaddle.wordpress.com/classic-kit-chemical-apparatus-with-a-name/>

## NEWS AND UPDATES

### Partington Prize

The Society for the History of Alchemy and Chemistry is pleased to announce that the 2011 Partington Prize has been won jointly by Marcos Martín-Torres of the Institute of Archaeology, University College London, for his essay “Inside Solomon’s House: An Archaeological Study of the Old Ashmolean Chymical Laboratory in Oxford,” and Evan Ragland, currently Sidney M. Edelstein Fellow at the Chemical Heritage Foundation, Philadelphia (and a doctoral candidate in the Department of the History and Philosophy of Science, Indiana University) for his essay “Chymistry and Taste in the Seventeenth Century: Franciscus dele Boe Sylvius as a Chymical Physician between Galenism and Cartesianism.”

## Royal Society Exhibition

### Visualising Matter: The Graphic Teaching Tools of Chemistry in the Age of Revolution

12 July - 31 August, Small Exhibition, Royal Society of London, Carlton House

During the late eighteenth-century chemistry emerged as a cutting-edge scientific discipline in Europe. This intellectual ascent was sparked by the rise of medical chemistry, mining academies, the industrial revolution and the discovery that air was not a singular substance. Indeed, the isolation of carbon dioxide, oxygen and other gases from the 1750s forward yielded progressive views on the composition and nature of matter. This led the French aristocrat Antoine Laurent Lavoisier to promote a revised nomenclature of elements based on new theories of combustion, heat and acidity. While the story of his contribution to elegant experiments and exact instrumentation is well known, the day-to-day practices of how chemical knowledge was taught to students and disseminated to the public have received less attention. *Visualising Matter* addresses this lacuna by focussing on the graphic tools used to teach chemistry from the 1760s through to the 1810s, that is, the fifty-year spread of the Chemical Revolution. Highlights of the exhibition include the work of Joseph Priestley, Joseph Black, Antoine Lavoisier and Sir Humphry Davy.

The exhibition shows that the new theories of Lavoisier were introduced into a graphic culture of representation that had many strengths and which was eventually adapted to promote the new chemical system. This event is part of an AHRC funded-project entitled “The Reordering of Things” being run by Dr Matthew D. Eddy of Durham University. It is open to the public, but you must contact Dr Felicity Henderson to book a viewing date and time in advance.

Contact: [felicity.henderson@royalsociety.org](mailto:felicity.henderson@royalsociety.org); 0207 451 2597.

How to get there: <http://royalsociety.org/visit-us/>

### Syracuse University Plastics Collection Goes Online

The Special Collections Research Centre at the Syracuse University Library has unveiled a new website, <http://plastics.syr.edu> devoted to its significant Plastics Collection. The website is a treasure trove of information and images of the 2,000 plus artefacts in the Plastics Collection, the largest university-based resource on the history of plastics. The site also links to more than forty archival collections on the history of plastics, and to the library’s catalogue of several thousand books and periodicals related to the

history, science, technology and business of plastics. New information and artefacts are added regularly.

For more information, contact Sam Gruber, curator of the Plastics Collection: [sdgruber@syr.edu](mailto:sdgruber@syr.edu)

#### **News from the Chemical Heritage Foundation (CHF)**

Up to date information on activities for the International Year of Chemistry can be found at:

<http://www.chemheritage.org/visit/events/international-year-of-chemistry-2011.aspx>

#### **USEFUL WEBSITES AND ADDRESSES**

##### **American Chemical Society Division of the History of Chemistry**

<http://www.scs.uiuc.edu/~mainzv/HIST/index.php>

##### **The British Society for the History of Science**

<http://www.bsbs.org.uk>

##### **Chemical Heritage Foundation**

<http://www.chemheritage.org/>

##### **CHEM-HIST: History of Chemistry Electronic Discussion Group**

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**Walter Sneader's website 'Sources of information about drugs and medicine'** <http://historyofdrugs.net>

##### **Website for the history of science and technology in Europe**

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**Website based lecture course by Georges Bram, professor of chemistry and history of chemistry at the Faculty of Science, Paris Sud-Orsay**

<http://histoirechimie.free.fr/>

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## Centenary of Marie Curie's Nobel Prize for Chemistry

### From Polonium to Curium: a Celebration of the Chemistry of Marie Curie

This UNESCO International year of Chemistry is dedicated to female chemists and happily coincides with the centenary of the award of her second Nobel Prize, that for chemistry, to Marie Curie (1867-1934), celebrated at our one-day meeting at Burlington House on 18 March (see report, p. XX). This article concentrates on the discoveries, by Pierre and Marie Curie, of polonium and radium and, briefly to the discoveries by others of the Curie-associated elements actinium, francium and curium. There are good biographies of the Curies (1), background material and translations of several early papers (2, 3) and summaries of the history and chemistry of these elements (4).



Maria Salomea Skłodowska was born in Warsaw on 7 November 1867; her mother died in 1878. She graduated from her *gymnasium* aged 15, top of her class. Because advanced study was denied to girls in Poland, she went, like

her sister Bronislawa had done earlier, to Paris. She enrolled at the Sorbonne in 1891; in 1893 she came first in physical sciences and in 1894 second in mathematics. She met Pierre Curie in 1894 and they married in 1895. It was a happy but tragically short marriage: they were united in their love of, and devotion to, science and their two daughters.

In November 1895 Wilhelm Röntgen (1845-1923) discovered X-rays, and four months later Henri Becquerel (1852-1908) discovered radioactivity when he found that uranium salts (using  $K_2[UO_2(SO_4)_2] \cdot 2H_2O$  which he misformulated as  $[K(UO)(SO_4) + H_2O]$ ), and also pure uranium, fogged photographic plates wrapped in black paper (5). Marie decided to do her Ph.D. on Becquerel's 'uranic rays'. Results came quickly, with 1898 as an *annus mirabilis* for the Curies: their three papers that year established the basis for radioactivity.

In the first of these Marie published on her own as Mme. Skłodowska-Curie (she used several variants of her name, faithfully recorded in the reference list below). The paper was read to members of the Académie des Sciences by her old mentor Gabriel Lippmann (members read papers to their colleagues on Monday evenings and they were printed within the next ten days in *Comptes Rendus*). Using a piezo-electroscope she measured accurately the degree of radioactivity of samples from the conductance of ionised air. Amongst many materials she found that only uranium and thorium compounds were radioactive (unknown to her, G.C. Schmidt two months earlier in Berlin had shown this for thorium). Her key observation however was that the radioactivity from nine different uranium salts, and uranium itself, was substantially *less* than that from the ores chalcocite,  $Cu(UO_2)_2(PO_4)_2 \cdot 12H_2O$  and pitchblende,  $UO_2$ . She concentrated on the latter, using three samples of differing provenance, concluding that pitchblende must contain a new element (6).

**Polonium, element 84.** Three months later a second ground-breaking paper appeared, this time with Pierre. By dissolving 100 g. of pitchblende in an unspecified acid (probably HCl) and applying a classical sulfide separation with  $H_2S$ ,  $(NH_4)_2S$  and  $(NH_4)OH$ , a much more radioactive material than uranium was detected, 'carried' by bismuth sulfide. They could not isolate this species and their spectroscopist Eugène Demarçay (1852-1904) identified no new atomic spectral line, but they wrote that ".....if the existence of this new element is confirmed, we propose to call it polonium from the country of origin of one of us." The paper was read to the Académie, appropriately, by Becquerel, and is remarkable too for coining the word *radio-active*, used in the title but nowhere else in the text (7). The Curies used language creatively – polonium is an inspired name, as are the words radio-active and the evocative *radium* for their second new element.

The subsequent early history of polonium is confused. In a paper of 1902, which they must subsequently have regretted, they wrote “polonium is a species of active bismuth; it has not been proved that it contains a new element” (8) – they did not then realise that, unlike radium, polonium has a short half-life. Earlier that year, Rutherford and Soddy had clarified related problems in their clearer understanding of the nature of radioactivity (9). Friedrich Giesel (1852-1927) in Braunschweig and Willy Marckwald (1864-1942) in Berlin attempted to isolate polonium between 1899 and 1906. Marckwald isolated a material which he at first called *radiotellurium* from elemental bismuth in a purified pitchblende solution (10). This evinced a protest from Marie Curie (11) who said that Marckwald had misunderstood her (in the quotation above in (8)). Finally Marckwald agreed (12) that ‘radiotellurium’ and polonium were identical, quoting, in English, *Romeo and Juliet* (act 2, sc. 2, l. 43):

What’s in a name? that which we call a rose  
By any other name would smell as sweet

Marie then used Marckwald’s procedure with metallic bismuth to isolate small amounts of polonium, and showed that its half-life was 140 days (13).

The chemistry of artificially produced  $^{210}$ polonium was studied at Harwell in the 1960s (4, 14). It is a Group 16 element, with VI, IV, II and –II oxidation states, having more metallic character than its congener tellurium, glowing blue in the dark. In Mendeleev’s 1889 Periodic table it appears as *divitellurium*, predicted atomic weight 212 (modern value 209.98). Earlier uses involved its antistatic properties, but it is now used, with beryllium, as a source of  $\gamma$ -free neutrons. Irène (Marie’s elder daughter) and Frédéric Joliot-Curie (awarded the 1935 Chemistry Nobel Prize for transmutation of light radioactive elements) used polonium  $\alpha$ -sources. It is intensely toxic, as the 2006 Alexander Litvinenko case shows (15). There are forty-six reported radio-isotopes (16).

**Radium, element 88.** In their third classic 1898 paper, read by Becquerel on Boxing Day, the Curies announced the discovery of radium. Sulfates obtained from pitchblende dissolved in  $\text{H}_2\text{SO}_4$  were separated, dissolved in HCl, and  $\text{RaCl}_2$  partially separated by recrystallisation from the more soluble  $\text{BaCl}_2$ : this time Demarçay observed a new spectral line, at 381.5 nm. Only minute traces were obtained of this highly radioactive material (17).

A now expectant world awaited real proof of the existence of radium, involving the Curies in nearly four years of dreadful toil (1). The Vienna Academy, Austrian government and Baron Edmond de Rothschild procured for them 8 tonnes of uranium-depleted pitchblende from the Joachimstahl

mines. They ground this up in 20 kg. lots, removed impurities followed by thousands of recrystallisations of  $\text{BaCl}_2$ - $\text{RaCl}_2$  solutions. By 1902 they isolated 0.1 g. of  $\text{RaCl}_2 \cdot 6\text{H}_2\text{O}$  and estimated the atomic weight of radium as  $225 \pm 1$  (18). Pierre and Becquerel noted that radium caused burns, leading in part to its use for cancer radiotherapy (19), work which Marie and many others continued. In 1903 the Physics Nobel prize were awarded, half to Becquerel, and the other half to the Curies “in recognition of the extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor Henri Becquerel.”

By 1907, after the tragic death on 19 April 1906 of Pierre Curie in a road accident (1), Marie had isolated 0.4 g. of  $\text{RaCl}_2 \cdot 6\text{H}_2\text{O}$  and re-determined the atomic weight as 226.45 (modern value 226.03) (20). In 1910, she and André-Louis Debierne isolated radium metal by electrolysis of the chloride in the presence of metallic mercury, then distilling off the latter from the amalgam so formed (21). Radium is an alkaline-earth element (oxidation state II) (4); a Periodic table of 1902 placed it as *eka*-barium, atomic weight 226. There are at least forty-two radioactive isotopes (16). The metal glows blue in the dark (there are stories of Pierre carrying small samples of  $\text{RaCl}_2$  in his pocket to show to friends that they were always warm – he burned himself and Lord Kelvin with such samples).

In 1911 Marie was awarded a second Nobel Prize, this time in Chemistry, “for the discovery of the elements radium and polonium, the isolation of radium and the study of the nature and compounds of this remarkable element.”

**Actinium, element 89.** Although who first discovered actinium is still hotly debated, a prime candidate is André-Louis Debierne (1874-1949), an early associate of the Curies. He became their lifelong friend, isolated radium with Marie in 1910 (21) and succeeded Marie in 1934 as director of the *Institut du Radium*. In 1899 he published a vague paper claiming a feebly radioactive new element from pitchblende, naming it *actinium* in 1900 (22) (that evocative name - from *actinos*, a ray – was perhaps suggested by the Curies). In 1899 at least he was probably dealing with radiothorium. Whether he or Giesel first truly identified actinium is not clear: Adloff champions Debierne (23) while Kirby favours Giesel (24). Both concede that Otto Hahn (1879-1968), discoverer of nuclear fission, may have a claim too. Actinium has some 52 isotopes (16) and behaves like a lanthanide (4).

Marie Curie died on 9 July 1934 of leukaemia and was buried with Pierre in the Curie family grave; their coffins were transferred to the Panthéon in 1995.

## Two post-Curie elements.

**Francium, element 87.** This was discovered by an ex-student of Marie, Marguerite Perey (1909-1975) at the *Institut du Radium* in 1939. She became in 1962 the first female member of the venerable *Académie des Sciences*, an honour denied both to Marie and Irène Curie. She found that almost all  $^{227}\text{actinium}$  decayed by  $\beta$ -emission to  $^{227}\text{thorium}$ , the remaining 1.2% by  $\alpha$ -emission to a species (itself a  $\beta$ -emitter) with a half-life of only 21.8 minutes, 'carried' by Group I elements. This she eventually named *francium* (25): it has never been isolated and virtually nothing is known of its chemistry, though it is clearly a Group I element (4). It is the *dvi*-cesium of Mendeleev's 1871 table, predicted atomic weight 220 (modern value 223.02). There are forty-nine reported isotopes (16).

**Curium, element 96.** This was made in the 60-inch Berkeley cyclotron in 1944, by 40 meV  $\alpha$ -bombardment of  $^{239}\text{plutonium}$  to give the neutron-emitting  $^{243}\text{curium}$  (26), named after the Curies. Chemically it closely resembles gadolinium in its chemistry, with most of its compounds in the trivalent state. It is used in remote-sensing devices and as heat sources in satellites. There are some twenty-nine isotopes (16).

**Conclusions:** This article has summarised the Curies' key chemical work, with brief notes on three Curie-associated elements. Their research was always curiosity-driven, for pure scientific interest and not for profit (they refused to patent the discovery of radium). No better conclusion can there be than that in this passage by Marie, as relevant today as when she wrote it:

We must not forget that when radium was discovered no one knew that it would prove useful in hospitals. The work was one of pure science...Scientific work .....must be done for itself, for the beauty of science, and then there is always the chance that a scientific discovery may become, like radium, a benefit for humanity.

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See \*(3) and \*(4) for English translations.

Bill Griffith  
Imperial College London

### Some Thoughts on Marie Curie, Double Nobel Laureate

The year 2011 has been designated the International Year of Chemistry, the year being chosen to coincide with the one hundredth anniversary of the awarding of the Nobel Prize in Chemistry to Marie Curie for her discovery of the element radium. Others have summarized her life and work, while we thought it interesting to focus on the image of Marie Curie and the effect of the image on perceptions of her life and work.

Often believed to be of French heritage, in fact Marie Sklodowska was Polish and very proud of her Polish ancestry. In fact, she insisted on Polish governesses for her two children and the first element that the Curies discovered was named polonium in honour of her native land. To her adopted country of France, Marie Curie was an object of suspicion not only because, in addition to being a woman in a male preserve, she was a 'foreigner' during a xenophobic era and also an avowed atheist in a very Catholic country. This last point played a significant role in her failure to garner sufficient votes to win membership of the Académie des Sciences (1).

The first biography of Marie Curie was written by her younger daughter, Eve Curie, and it appeared in English translation in 1938 (2). Naturally, this book raises her mother to near sainthood – “our lady of radium” (3) – and these days would be called a hagiography in terms of its uncritical praise. The book was used as the basis for the 1943 movie, *Madame Curie*. In a study of the making of the movie, Alberto Elena comments: “The superhuman feeling is accentuated by the apparent insensibility, self-control and lack of emotion in the Marie Curie of the film, particularly in the sequences which follow Pierre’s death. In this, the film differs conspicuously from Eve Curie’s biography where she underlines dramatically the anguish which is tearing her mother apart.” (4) Presumably, the screen writers felt that Curie should behave in the way which scientists are usually depicted – cold, dispassionate, and dedicated only to their work.

Even though the movie is about the life of Marie Curie, not Pierre Curie, Elena also observes: “It is worth noting that, throughout the film, Marie always comes second to Pierre ...” (4) This role of assistant reinforced the image that Marie Curie was simply an unpaid laboratory technician to the ‘great man’ Pierre Curie. Sadly, this viewpoint was held by many of Curie’s

male contemporaries who claimed that, in addition to playing a subordinate role in the joint work, Marie Curie did not publish anything of significance after Pierre Curie’s death (5).

Popular articles on Curie emphasized more about her devotion to Pierre Curie and her roles as wife and mother than they did her scientific expertise. For example, in 1907, an article on Marie Curie included the quote by Curie’s neighbour and close friend, Mme. Perrin that Marie Curie was admired: “... not only for her marvellous intellect and genius, but because she has been the most perfect of wives, and is the best of mothers ...” (6).

Marcel LaFollette has commented: “Women scientists – most notably, such women as Marie Curie and Margaret Mead – were depicted as something more than ordinary – not only exceptional scientists but also exceptional women.” (7) Stephen Brush has pointed out that the depiction of Curie’s life and work was scarcely one to encourage young girls to emulate: “But the brief descriptions of Marie Curie’s work that appear in popular science books make it sound like the worst form of drudgery: slaving over hot vats for four years, repeating over and over again the same routine fractionation process, in order to produce a little bit of radium. And what good did it do her, aside from winning two Nobel Prizes? ... To Marie Curie it brought a painful death from a disease caused by radiation exposure.” (8)

Margaret Rossiter has thoroughly documented the preferential writing-out of women scientists from the scientific historical record (9). However, in the Curie’s case, it was the young male physicist, André Debierne, who suffered this fate. Though the Curies are depicted as having worked alone, it was Debierne who contributed greatly to the large-scale separation of radium. As Robert Reid noted in his biography of Curie, “Debierne was never to leave the shadow of the Curies. He published several papers in co-operation with both of them, discovered a third new radioactive element, actinium, and was instrumental in the success of the experiments which Marie Curie was now bringing towards their final phase.” (10) Following Pierre Curie’s death, it was Debierne who was Marie Curie’s *chef-de-travaux* (laboratory manager), and who prepared metallic radium for the first time, confirming it for certain as a new chemical element.

Biographical accounts tend to emphasize Marie Curie’s collaboration with Pierre – the prototypical great scientific partnership. Such a viewpoint is particularly found in popular accounts aimed at children, where the death of Pierre and the grieving widow is essentially the focus of the saga (11). Amazingly, the first proper biography of Marie Curie was not published until 1974 (10) and only in the last twenty years have critical and thorough accounts of her life and work appeared (12).

Recently there has been an interest in the research work during the later years of Marie Curie's life. J.L. Davis has studied Marie Curie's research school, that is, the large group of young researchers who worked with her between 1907 and 1914 (13). Many of these researchers were women, the most prominent role being played by the Norwegian chemist, Ellen Gleditsch (14). In fact, in addition to many French women scientists working with Curie, young women came from Britain, Romania, Poland, Hungary, Canada, and Sweden, to undertake research with "the renown Madame Curie." (15) It is not often realized that between 1906 and 1934, 25-30% of the workers in the Curie laboratories were women (16).

It would appear that, at the time, Marie Curie's story fired the enthusiasm of some girls for a future in chemistry. As illustration, an article in a 1904 issue of the student magazine of the University College, Dundee, Scotland (now the University of Dundee) commented: "The fame of Marie Curie seems to have stimulated the female sex to pursue the study of chemistry. The advanced class [in chemistry] is composed of four women students, and one solitary male. Changed days indeed." (17)

Though Curie served this role in encouraging women into science, it did not extend to enable qualified women to obtain academic positions. Margaret Rossiter described the effect of Marie Curie's visit to the United States in 1921 as raising the bar for women chemists to unattainable levels: "But before long most professors and department chairs were interpreting Curie's example far more restrictively and expecting that every female aspirant for a faculty position *must* be a budding Marie Curie. They routinely compared American women scientists of all ages to Curie, and finding them wanting, justified not hiring them on the unreasonable grounds that they were not as good as she, twice a Nobel Laureate!" (18) In that respect, then, Curie's example served to delay the progress of academic women in chemistry (19).

Thus as Marie Curie's Nobel Prize in Chemistry has become the focus for the International Year of Chemistry, it is important that we untangle the life and work of the real Marie Curie from the images that have been manufactured to reflect the ideological goals of past biographical accounts.

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A version of this article first appeared as "Some Thoughts on Marie Curie, Double Nobel Laureate," M. Rayner-Canham and G. Rayner-Canham, *Chem13 News*, 24-26 (December 2010-January 2011).

Marelene Rayner-Canham and Geoff Rayner-Canham

## BOOK REVIEW

José Hurwic, *Maria Skłodowska-Curie and Radioactivity* (Galant Editions: Warsaw, 2011); 49 zlotys - about £10 - at the Marie Curie Museum, 6 Freta Street, Warsaw). ISBN 978-83-929386-2-0, pp. 148.

This handsomely produced hardback book has been produced by the Marie Curie Museum in Warsaw for the centenary of Marie Curie's 1911 Nobel Prize in chemistry. It is attractive for the scientific reader and historian because, unlike so many hagiographical books on Marie, it is written by someone who understands the science (Hurwic is a chemist who became Dean of Warsaw's Technical University, had to flee the country in 1968 and became Professor of Chemistry at the University of Marseille). The book covers, briefly but well, essential biographical details and has a remarkably good list of references to the original literature (172 in all). Pierre Curie's work is also included. The first two chapters cover her childhood and academic training, the next three her scientific achievements, then one on her scientific activity in Poland, and a final assessment of the Curies' science.

The style of English is good with only a few oddly-phrased sentences; more serious is the replacement of 'sulphides' by 'sulphates' (both spelled with 'ph' throughout) in some cases – clearly a translator's error as the earlier Polish version is correct. There are 50 sepia photographs, some from the author's own collection, with diagrams and reproductions of parts of documents.

If you happen to be in central Warsaw then this little book is well worth its 49 zlotys, and the museum itself worth visiting too. It is housed in Maria Skłodowska's birthplace, 6 Freta Steet, in the centre of the Old Town. The building was reduced to rubble, as was 80% of Warsaw, by the vicious German reprisal for the Warsaw Uprising of 1944, but has been faithfully rebuilt in its original style.

Bill Griffith

## SHORT ESSAYS

### George Kakabadse (1917-2002): Analytical Chemist with a Remarkable History

In the second half of the twentieth century, George Kakabadse (GJK), born 18 December 1917, was known as a quiet, unassuming and independent, but talented, helpful and popular member of UMIST's Chemistry staff. He was experienced in inorganic analysis research and service and painstaking in demonstrating to and teaching students and in their welfare. GJK was in demand for translating chemical and crystallographic papers in either German or Russian; this was especially valuable on fluorine compounds for the group of Prof. R.N. Haszeldine, FRS, who spoke very highly of Kakabadse. During the 1950s to 1990s, GJK's publications, mainly involving novel analytical methods, in the *Analyst*, *J Chem Soc A*, *Mikrochim Acta*, *Measurement and Control*, and *Nature* embraced vanadium oxides in glasses (in *Physics and Chemistry of Glasses*), ion-selective electrodes in non-aqueous media, electrical conductivity of Na<sup>+</sup> ions, effect of magnesia on magnetite formation, water content of mixtures, and determination of fluorine in biological materials. He also edited, in 1979 and 1984, the Proceedings of Symposia on effluent treatment and on industrial solvent problems. His last joint publication in *Physical Chemistry: Chemical Physics* was as late as 2001.



Colleagues were unaware of most of his earlier or private life but GJK (or Juri Kavilovitch Kakabadse) had a distinguished heritage and an extraordinary background in Georgia, Russia, Germany, Greece and elsewhere before settling in the UK. In summary, having grown up in a family that knew Josef Stalin but was subsequently sentenced to death by the USSR, GJK qualified in chemistry and spent World War II in Nazi Berlin, worked for British Intelligence, chased Nazis in Austria and Switzerland, and then, based in the UK, did not see his Greek wife and son for several years.

GJK's father, Kyrill Kakabadse (KK), was a boyhood friend of Stalin, to whom he introduced GJK. After the First World War, KK became Deputy President of the Caucasian Republics and President of the breakaway (from the USSR) republic of Georgia. GJK described visiting, as a small boy, the presidential office, with its leather chairs, wall portraits, and historic statuettes. When Andrew Kakabadse (AK, son of GJK), was invited

professionally to visit Georgia during the Cold War in 1983, incredibly the layout of the same historic room seemed almost unchanged. In 1918-1919, KK commanded the Bolshevik garrison in Petrograd (later called Leningrad and St Petersburg) against the Whites (i.e. Russian Tsarists) during the civil war. Between 1921 and 1934, KK survived being out of and in favour with Stalin. When mildly out of favour and as a Georgian, he was exiled to Moscow (Lenin was still in power). As with many of the exiled Bolsheviks, part of the punishment or rehabilitation back into the Party appeared to be a nightly ticket to the Bolshoi Ballet! While in favour, KK became Transport Commissar, planning the transport system of the emergent Soviet Union, particularly new roads and railways. Despite the quarrels with Stalin, KK was sent in 1932 to head a Russian state mineral sales company trading with the rest of Europe. However, in 1934 while in Berlin, KK denounced Stalin and, having been sufficiently trusted to take his family abroad, a death sentence for treason was passed on him and the family to last four generations. Since the Kakabadses were to be executed, should they be apprehended on Soviet territory, AK should have been arrested and shot when he visited in 1983. Fortunately, the historic family connection was realized only late in the visit but AK was then given twenty-four hours to leave. Armed police and dogs were on hand to ensure compliance, but AK's rapid departure from the USSR avoided the embarrassment of the authorities arresting an honoured guest of the Georgian government and hence, by implication, of the USSR.

Following expulsion from Georgia in 1934, the Kakabadse family underwent many tribulations in Berlin. Being formally stateless, the family had no state benefits and was near starvation, with KK taking menial jobs. However GJK, a tall, very fit man, competed for Germany in athletics in the 1936 Olympics.[One Leeds colleague recalls GJK's black-humour story of the troika-sledge ride in Georgian wolf country; old ladies were carried, to be jettisoned periodically to facilitate the sledge's escape from the wolves.] As a stateless person GJK was not called up for military service. He was, however, bright enough to gain admission to the prestigious Berlin Technische Hochschule (Institute of Technology), taking a first degree in chemistry, followed by a Dr Ing in inorganic chemistry in 1943. At some stage, he became a British agent and, towards the end of World War II, was engaged in anti-Nazi activities in the mountains of Czechoslovakia, Austria and Switzerland. In Austria, he wore the uniform of the Lancashire Fusiliers, for whom he was a translator, and subsequently expressed the hope that the British were more careful in their security vetting of more crucial cases than

they had been with him. He remained concerned about the British in Austria in 1945 returning the Cossacks to be murdered on Stalin's orders.

After the War, GJK sought employment in several countries, including Greece, where he married Elfrieda Meissner, who had been a refugee; her parents were victims of the displacement of Greeks from Smyrna (now Izmir) during the Greek-Turkish war. GJK's and Elfrieda's first child, Andrew (AK), was born in 1948. Shortly afterwards, GJK came to England unaccompanied and was engaged in 1948 in Leeds University's Department of Inorganic and Physical Chemistry by chemical crystallographer Professor E.G. (later Sir Gordon, FRS) Cox (a TA Lieutenant-Colonel who had been involved with SOE devices and German technical intelligence). GJK had a very straight-faced sense of humour and, in the teaching lab, would sometimes have a beguiling way of stumping medical students by affecting an ignorance of class experiments which in reality he knew very well. One gathers that something of his dry approach and wit, as well as his breadth of interests, has been passed on to the next generation, though evidently not the enthusiasm for chemistry (see below).

In the years around 1950, in Cox's research group, GJK was a knowledgeable adviser on chemical practicalities, including slow crystallization, peristaltic pumps, thermal reactors, and degassing a Raymax continuously evacuated X-ray set. One contemporary remembers him aligning a crystal on an S25 goniometer in the evening, as one did, when he realized that he had been carrying out the whole process looking directly down the un-shuttered X-ray beam; there seemed to be no ill effects. He utilized a low-temperature cold room for some X-ray experiments clad in Arctic clothing. In the Department, he taught courses on basic German and Russian; my last letter from him in 1996 had its opening greeting in German and closing farewell in Russian. He also played competitive basketball, led us rock climbing at Almscliff Crag and Ilkley Rocks, and gave me my first experience of dinghy sailing. While GJK often climbed barefoot, he introduced us to the novel concept of Vibram rubber soles in contrast to our metallic clinkered boots. With the Professor's son, Keith Cox (later also FRS), GJK camped informally at Edinburgh to visit the Festival at minimum cost.

In 1951, GJK was able to make his first return visit to Athens and for his son to be aware of him for the first time. The family was re-united in England in 1953, and a second son Mario was born in 1954, followed by daughters Lydia and Juliet in 1956 and 1958. In 1952, GJK was appointed Lecturer in the Chemistry Department of the Manchester College of Science and Technology, which became UMIST (now merged with the Victoria

University of Manchester); he was later Senior Lecturer and retired in 1982. Former colleagues recalled how GJK, supervising the analytical unit at UMIST, had nurtured the talent of a skilled analyst refugee Experimental Officer of Yugoslav/Russian extraction, Vassili (Basil) Manohin. They published several papers together, 1956-1971 (including two in German), and GJK ultimately ensured Manohin's funeral in the Greek Orthodox tradition. Kakabadse's final research on the continuous determination of trace elements of water in solvents was with Manohin's successor, Dr Roger Perry, who was encouraged by GJK to expand the analytical unit to analyse for forty-five elements in research materials produced within the Department.

All four of GJK's children are graduates, AK and Mario with Ph.Ds. AK is a Professor of International Management Development at Cranfield School of Management. Mario, with degrees in each of Politics, Administration and Policy, is with the World Trade Organisation. Lydia, a classical musician qualified in accountancy and law, works in corporate law. Juliet, who spent some time in Russia, has two children but teaches Russian part-time. Unhappily, Elfriede Kakabadse is now seriously ill. GJK was born into and remained in the Russian Orthodox Church. He died suddenly (so that former colleagues were unaware) of liver failure at Timperley, Manchester in October, 2002, and was buried in the Greek Orthodox tradition

One hopes that this memoir provides some recognition of the remarkable history of a gentle man who provided considerable service to chemists and chemistry. I am especially grateful for the memories of Professor Andrew Kakabadse, and also for those of Ms Lydia Kakabadse and nine surviving former colleagues (one in Croatia and several in their eighties) at Leeds and Manchester.

Emeritus Professor Derry W. Jones  
Chemistry and Forensic Sciences  
University of Bradford

The photograph of George Kakabadse is reproduced with permission from Prof. Andrew Kakabadse.

### **The Moissan-Stock-Emeléus connection**

At first glance one might think that the famous German boron hydride chemist Alfred E. Stock (1876-1946) is the odd man out where the above trio of inorganic specialists is concerned. It is not so, of course, since at the turn of the nineteenth century Stock spent time in Paris with Moissan and

later (1927) acted as mentor in Karlsruhe to the young Dr Harry Julius Emeléus from London (Imperial College). These connections enabled Emeléus (1903-93) to remark in post-WW2 years, that is, once he had established himself as a leading UK fluorine chemist, that his 'academic ancestry' included Moissan.

### **Moissan-Stock**

Stock is remembered chiefly for his work during the period 1910-1936 on hydrides of boron and silicon, and for the development of high-vacuum apparatus which made that work possible. His doctorate from the University of Berlin (1899) was based on studies in analytical and organic chemistry under Oskar Piloty (Adolf von Baeyer's son-in-law), and he was sent to Moissan's laboratory by von Baeyer's brilliant ex-student Emil Fischer, top dog of the time in Berlin and architect of a new chemical institute large enough to house 250 people [when opened in 1900, this was 'the largest chemical laboratory suite in the world' (see W.H. Brock's *The Fontana History of Chemistry*, 1992, p.428)]. Apparently, Fischer was so impressed by Stock's reputation as an experimentalist that he decided to have him trained as an inorganic chemist in a French school of excellence, then to set him up in Berlin to help with the "rebuilding of inorganic chemistry in Germany" (see E.K. Mellon, *J.Chem.Ed.*, 1977, **54/4**, 211-213).

Stock was introduced to boron chemistry by Moissan. Their papers on boron silicides appeared in *Compt. rend.*, **131**, 139 and *Ann. Chim. Phys.*, (7), **20**, 433 in 1900, the year of Stock's return to Berlin, where he installed a gas-collection device involving a mercury trough of the type he had used in Paris and employed it to work on stibine (SbH<sub>3</sub>, b.p. 17 °C). According to Mellon (see above), he laboured in a small unventilated room and began to experience headaches, dizzy spells, memory loss, and attacks of catarrh: the effects of inhaling mercury vapour (not recognized then) were beginning to show. 'Quecksilbervergiftung' - mercury poisoning - which afflicted Stock, on and off, almost to the end of his life, was not diagnosed as the cause of his bouts of chronic ill health until 1924. This prompted him to embark on researches into mercurialism and environmental mercury which gave rise to an impressive raft of papers, announcements in both popular and scientific texts, and transcripts of lectures warning of mercury contamination in laboratories.

Stock appears to have been hypersensitive to mercury, a situation thought to have arisen from contact with the element in a home laboratory during his youth; and inevitably all of the laboratories he worked in subsequently were contaminated with the metal at the outset, before he made things worse by

setting up mercury-dependent gas handling apparatus essential to his research on boron hydrides.

In his book, *The Elements of Murder: A History of Poison*, John Emsley refers to the unintentional mercury contamination of chemistry laboratories through the ages, and opines that “The popular image of the mad scientist may have some basis in fact and could have been due to the effects of mercury vapour because every laboratory was polluted by it, and even when spilled mercury was cleared up, it was almost impossible to track down every last drop”. He also devotes space to Stock’s mercurialism problem.

### Enter Emeléus

Stock initiated his work on boron hydrides in 1910, shortly after moving to a chair of chemistry in Breslau (as it was then), but when Harry Emeléus caught up with him in 1927 he was in Karlsruhe. Even there Stock’s suffering continued unabated despite his attempts to maintain free-from-spilled-mercury laboratories and to avoid air-space contamination by housing his group’s mercury-charged vacuum systems in fume cupboards. Harry was directed to help with pioneering studies on decaborane. Nothing was published in his name from Karlsruhe; however, I’m fortunate to have been given a handwritten autobiography by Harry way back in 1979, and this is what he wrote about his time in Karlsruhe: “The year in Germany was a *turning point* [HJE’s emphasis]. Stock was a perfectionist. Incidentally, he had worked with Moissan, so that I had Moissan in my academic ancestry after all. I worked with one of his [Stock’s] assistants, Dr E. Pohland, on the first isolation of B<sub>10</sub>H<sub>14</sub>, learning a lot about vacuum line techniques. As a side line I also helped with mercury analyses for Stock who had been exposed to excessive concentrations of mercury in his Berlin laboratories. I am, I think, one of the few left who can vouch for the fact that Stock really had mercury poisoning. We used to obtain a visible globule of metallic mercury from 1 litre of urine in the course of the analysis”.

Appropriately, among the many honours bestowed on Emeléus during his long career stands the Stock Medal of the German Chemical Society\*. He was also a recipient of a Moissan Fluorine Centennial Medallion (1986) and won the 1991 Moissan Prize. Of incalculable value down the years to preparative chemists in the UK whose work involved volatile compounds was Emeléus’ decision to bring home from Karlsruhe the means to manipulate such materials. “I built”, he recorded in his autobiography, “the first proper vac line ever seen in the UK on my return to London, using mercury float valves purchased in Germany, and taught this technique to many students in later years”. I can vouch for that, since many of my own contributions to fluoro-organic chemistry were achieved using modern

Emeléus-style high-vacuum technology transferred from Cambridge to Manchester in 1957 by a group of young fluorine chemists led by R.N. Haszeldine, one of Emeléus’ lieutenants newly appointed to the Chair of Chemistry in The Manchester College of Science and Technology (UMIST from 1966).

\*Note that the 2006 recipient of the Alfred Stock Prize was Karl Christe, winner of the 2000 Moissan Prize.

I can recommend the lengthy preface of *New Pathways in Inorganic Chemistry* (eds. E.A.V. Ebsworth, A. G. Maddock and A. G. Sharpe - all ex-students of Emeléus; Cambridge University Press, 1968) as an excellent source of detailed information on Harry Emeléus’ life and scientific achievements. It doesn’t refer to Stock’s urine, though!

### Emeléus at Cambridge

Coincidentally, mercury features as a reagent in the kick-start Emeléus gave to perfluoro-organometallic chemistry at the back end of the 1940s in Cambridge following his group’s discovery of the first routes to perfluoroalkyl iodides (A.A. Banks, H.J. Emeléus, R.N. Haszeldine, and V. Kerrigan, *J.Chem.Soc.*, 1948, 2188; H.J. Emeléus and R.N. Haszeldine, *ibid.*, 1949, 2948; J. Banus, H.J. Emeléus, and R.N. Haszeldine, *ibid.*, 1950, 3041), e.g. Cl<sub>4</sub> + IF<sub>5</sub> → (at 20-100 °C) CF<sub>3</sub>I; CF<sub>3</sub>I + Hg → (UV, 150 °C) CF<sub>3</sub>HgI. The Kerrigan halogen-exchange route to CF<sub>3</sub>I (Victor Kerrigan, by the way, was on secondment to HJE’s group from ICI) was soon replaced by the superior Hunsdiecker route [CF<sub>3</sub>CO<sub>2</sub>Ag + I<sub>2</sub> → (heat) CF<sub>3</sub>I + CO<sub>2</sub> + AgI], introduced independently (it is claimed) by Henne and Finnegan (*JACS*, 1950, **72**, 3806) and Haszeldine (*Nature*, 1950, **166**, 192; *J.Chem.Soc.*, 1951, 584), and the rest of the impressive Cambridge contribution to the chemistry of organo-elemental compounds of the perfluoroalkyl class is now well-reviewed history. [See, for example, the *New Pathways* ..... article mentioned earlier which also covers Emeléus’ involvement with WW2-related work on halogen fluorides at Imperial College and on uranium chemistry at Oak Ridge, Tennessee for the Manhattan Project. His important studies on halogen fluorides continued when he moved to Cambridge in 1945, including the synthesis of CF<sub>3</sub>I mentioned above.]

For any reader curious about HJE’s surname, he was the son of a pharmacist (Karl Henry Emeléus) from a Huguenot family which had fled from France to Finland before moving to England. Born in London on 22 June 1903, Harry spent nearly all of his pre-university life in the little town of Battle (site of the famous Harold vs William contest in 1066) in East Sussex, where

he attended Hastings Grammar School. With the aid of an entrance scholarship, he went up to London in 1921 to read Chemistry at the Imperial College of Science and Technology; that led to work in H.B. Baker's laboratory on the luminescent oxidation of phosphorus, the award of a PhD (1926), a year with Stock (1927), a DSc degree (1929), a Commonwealth Fund Fellowship doing photochemistry with H.S. Taylor in the US at Princeton University (1929-1931), an Assistant Lectureship at Imperial College (1931; salary £300 per annum) and, eventually, his move to Cambridge.

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Eric Banks

## RSC NATIONAL HISTORICAL CHEMICAL LANDMARKS

### Chemical Landmark plaque for Unilever

The presentation took place in the Unilever Port Sunlight Research and Development Laboratory on Wednesday 30 March 2011, to mark the centenary of their first R & D laboratory. After a buffet lunch, guests and research workers assembled in the main hall, and three speeches preceded the presentation.

Dr Mike Parkington, the Laboratory Director, said that this event celebrated one hundred years of the first purpose-built R & D laboratory at Port Sunlight. The original structure (the 'Flatiron' building), though much changed inside, is still in use and was built by William Hesketh-Lever (1851-1925, first Viscount Leverhulme) in 1911. There are some 750 R&D workers at Port Sunlight, including 200 PhD employees, constituting an international workforce. Many well-known Unilever brands, particularly detergents, soaps, hygiene and hair-care products were developed there. Professor Geneviève Beaver, the Chief R&D Officer, said that some 2 billion people worldwide used Unilever products. There is a considerable challenge for the firm to optimise existing products and develop new ones; research facilities were second to none in the laboratories with cutting-edge facilities.

Professor Paul O'Brien, Vice-President of the RSC and Professor of Inorganic Materials at Manchester University, thanked Unilever for hosting the event. The RSC Chemical Landmark Scheme was first introduced in 2001 and officially recognises historical sites in the UK where a significant chemical discovery or research has taken place. In this International Year of

Chemistry 2011 several plaques will be awarded in recognition of the importance of chemistry and the chemical sciences in meeting the challenges of every-day life. There are currently over 47,000 RSC members and the thirty-five Local Sections in the UK are encouraged to nominate historical sites for awards.

Paul thanked the Liverpool Local Section which started the nomination process for the Unilever Laboratory in 2007. The RSC had collaborated with Unilever in significant projects in recent years, including: their sponsorship of the RSC Team work in Innovation award given to reward and promote innovation and creativity, and a joint collaboration called *Project Splash* in 2008, aimed at addressing water management in peri-urban communities. Unilever also supports the Pan Africa Chemistry Network by attending conferences and providing keynote speakers.

Paul then handed over the plaque to Dr. Parkington and Prof. Beaver, and Dr. Parkington formally thanked Paul and the RSC. There was then a brief tour of two research facilities in the building, one concerned with the development and use of hair-care products and the other on the development of soaps and hygiene materials.

By 15.00 the plaque had been affixed to the building and was unveiled by Paul O'Brien and Mike Parkington. It reads:

**Unilever Research  
& Development  
Port Sunlight Laboratory  
In recognition of the  
outstanding scientific contribution to the  
fast moving consumer goods industry made by  
Unilever Port Sunlight's laboratory since 1911.  
One hundred years on, the people on site continue to  
deliver innovative products to enhance the  
lives of billions of consumers  
around the world.  
30 March 2011**

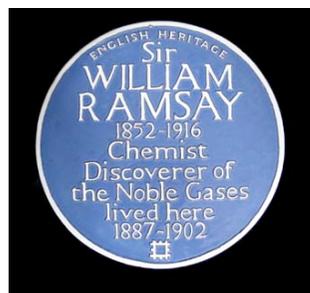
Bill Griffith

## ENGLISH HERITAGE PLAQUES

### English Heritage plaque to Sir William Ramsay

On Wednesday 9 February 2011, an English Heritage plaque was unveiled at 12 Arundel Gardens, Notting Hill, London, W11, where Sir William Ramsay (1852-1916) lived, from 1887 to 1902. From this pleasant terraced house he would cycle to University College (UCL) to work.

The plaque was unveiled at 14.00 by Baroness Kay Andrews, Chair of English Heritage, who spoke briefly about Ramsay; Dr Celina Scott, vice-Chair, described the English Heritage plaque scheme, and Prof. Alwyn Davies, FRS talked about Ramsay's career and his celebrated cycle rides from Arundel Gardens to UCL. He and Baroness Andrews then unveiled the plaque.



Twelve cyclists, led by Dr Andrea Sella (a Notting Hill resident and UCL lecturer who made the original application to English Heritage) then cycled to UCL – it took them 45 minutes on the route used by Ramsay – who wrote to a friend that the journey took him 18 minutes - Andrea pointed out that in Ramsay's day there were no traffic lights or one-way systems (though the streets were cobbled and pneumatic tyres for bicycles not then been invented). The author of this piece

was offered a Boris bike to do the trip, but took the Underground instead.

From 15.30 at UCL, in the Ramsay Lecture Theatre, Dr Fred Parrett, Chair of the SCI London Group and Andrea Sella introduced the afternoon's speakers. Prof. Alwyn Davies, in *Sir William Ramsay – the Man, the Myth and the Bicycle*, spoke about Ramsay's remarkable career. At UCL, where he was Professor of Chemistry from 1880, he isolated, with Lord Rayleigh, the noble gases neon, argon, krypton and xenon, and was one of those who discovered helium. In 1904 he was awarded the Nobel Prize in Chemistry for his noble gas work, the first British scientist to win a Nobel Prize (cf. RSCHG *Newsletter* February 2005 for an account of the unveiling of an RSC Landmark plaque at UCL commemorating the centenary of that Nobel Prize on 10 December 2004).

Dr Neil Todd of the University of Manchester then spoke on *Ramsay, Rutherford and Radium*. Finally, Professor Bill Brock gave a fascinating talk on *Victorian Scientists Living North of the Park*: these included A.W. Hofmann (Fitzroy Square), Edward Turner (Gower Street), Alexander Williamson (Euston Road), William Wollaston (Great Portland Street), Sir Benjamin Thompson (Count Rumford) in Cromwell Road and Sir William Crookes (Mornington Crescent, then Kensington Park Gardens).

The meeting ended in the Nyholm Room with drinks and, finally and appropriately, haggis and whisky, provided after a short address by Malcolm Grant, the Provost of UCL.

Bill Griffith

## MEETING AND CONFERENCE REPORTS

### Marie Curie and aspects of the History of Radiochemistry: Friday 18 March 2011

This was a joint meeting with the RSCHG and the RSC Radiochemistry group (RCG); the speakers, chairmen and M. Poimboeuf were invited by the RSCHG, while the RCG ran the meeting. There were some 110 people attending with some 55 from the RSCHG.

Professor David Phillips OBE, President of the RSC, welcomed those attending and expressed his pleasure that the meeting was to be formally opened by M. Jean-Claude Poimboeuf, the *Chargé d'Affaires* at the French Embassy in London: David spoke of the many chemical links between our two nations.

M. Poimboeuf spoke of the great pleasure he had in opening this conference. He reminded us of the many collaborative Anglo-French research projects (CERN etc.) and of the many contributions that our two nations have made to science, and to chemistry and nanotechnology in particular.

David Phillips chaired the first two morning lectures.

#### Marie Curie: a passion for science, action and people

*Dr Serge Plattard, Science and Technology Counsellor, French Embassy, London*

Marie Sklodowska-Curie opened a completely new field in physics. Her understanding of the radioactive decay of the atomic nucleus led the way in the early twentieth century to nuclear structure, nuclear spectroscopy and eventually nuclear fission. She and her husband Pierre discovered polonium and radium in 1898 showing genius, obstinacy and serendipity. Genius because she was bold enough to establish the real nature of the 'uranic rays' discovered accidentally by Henri Becquerel in 1896, becoming convinced that they originated not only from uranium but also from elements in much lower concentrations in pitchblende. She was obstinate in accomplishing four years of monumental work in a shabby laboratory, processing several tons of depleted uranium ore in order to obtain 0.1 g. of  $\text{RaCl}_2$  to determine the atomic weight of radium. She was serendipitous by meeting Pierre from her Polish connections, having the right timing, and using an electroscope based on the piezoelectric effect, discovered earlier by the Curie brothers, which was pivotal in measuring radioactivity.

After being awarded the 1903 Nobel Prize in Physics, shared with Becquerel, the Curies continued their studies on radioactivity and radiochemistry, (complementing those of Rutherford and Soddy), and initiated the supply of radium for treatment of cancer and lupus.

In 1910, the world standard for measuring amounts of radioactivity was the Curie unit. After her 1911 Nobel Prize in Chemistry, Marie fought for the creation of the Institut du Radium in Paris, just completed before the First World War. During that war, she and her daughter Irène developed mobile X-Ray units on the front lines, helping to save many thousands of lives through accurate pre-surgical diagnosis for the wounded soldiers. After the war, together with Dr Régaud, she contributed to the development of radiotherapy methods and instruments. In 1921 she traveled to the US to collect 1 gram of radium donated by American women, returning in 1929 to receive a cheque from President Hoover for purchase of another gram, which enabled the creation of the Radium Institute of Warsaw in 1932.

Marie died of leukemia at the age of sixty-six and was commemorated by Einstein who wrote “of all celebrated beings, the only one whom fame has not corrupted”....whose accomplishment was due “not only to bold intuition but to a devotion and tenacity in execution under the most extreme hardships imaginable, such as the history of experimental science has not often witnessed”.

### **The Early Use of Radionuclides in Medicine**

*Prof. Alan Dronsfield, University of Derby; Chairman of the Historical Group*

Until the mid-1890s the only successful treatment for cancer was surgery. To reduce the risk of relapse the surgeon would cut back into healthy tissue with resultant scarring and sometimes loss of function. Radiation to effect medical cures was introduced in 1895 by Niels Finsen. He used high-powered ultraviolet lamps to cure the tubercular skin disease *lupus vulgaris*. Wilhelm Röntgen discovered X-rays in the same year. It was quickly noticed that they could cause deep-seated burns to unprotected flesh and soon X-rays were being used to ‘burn out’ cancers as an alternative to surgical excision. Rays from radium caused similar burns and in 1901 the Parisian physicians Henri Danlos and Paul Bloch used a source of radium, borrowed from Pierre Curie, to cure a patient affected by *lupus vulgaris*. The radium treatment was effective against some superficial cancers of the skin, but had an advantage over X-rays in that it could be inserted in the form of applicators into body cavities to irradiate from within. Early statistics showed that treatment by surgery appeared to be twice as effective compared to radiotherapy, but surgeons only operated when they thought they had a reasonable chance of success. Radiotherapy was too often used as a treatment of last resort, often on hopeless cases. Comparing like with like, e.g. cancers that had not spread to the lymph system, success rates were closely comparable.

Like most newly discovered elements, radium compounds were used experimentally as conventional medicines such as for relieving the pain due to *diabetic neuritis*, but any success here can probably be attributed to the well-known placebo effect.

Rutherford often drew attention to the enormous amount of ‘latent’ energy resident in radioactive nuclei. This was quickly exploited for profit by unscrupulous manufacturers of tonics generally, and devices to restore potency to the impotent. Thus in the early years of the twentieth century there were radioactive contraceptive sheaths, *Vita* radioactive suppositories “for sexually weak men” and the *Radi-endocrinator* - sheets of blotting paper soaked in dilute  $\text{RaBr}_2$ , sandwiched between layers of metal gauze. Those who felt sexually deficient wore these, overnight, within an athletic support....and hoped that the irradiation from these radium sources would do the trick!

After lunch, attended by some fifty delegates, the first two afternoon lectures were chaired by Dr Nick Evans (Loughborough University), secretary of the RSC Radiochemistry Group.

### **Rutherford, Radioactivity and the Atom**

*Dr Jeff Hughes, Manchester University*

Born and educated in New Zealand, the physicist Ernest Rutherford began his research career in 1895 at the Cavendish Laboratory, Cambridge. After briefly working with J.J. Thomson on the newly-discovered X-rays, Rutherford switched to work on radioactivity. Energised by the Curies’ discoveries of radium and polonium in 1898 and the heating effect of radium in 1903, the field developed rapidly, connecting the disciplines of chemistry, physics and medicine in the early 1900s.

In his first post at McGill University, Montreal, Rutherford worked on the ‘emanations’ from radioactive elements and their subsequent characteristic radiations, and, with the chemist Frederick Soddy, articulated the disintegration theory of radioactivity. An energetic lecturer, he quickly became a public authority on the new science. For his work on radioactive decay he won the 1908 Nobel Prize for Chemistry – saying that this was the greatest transformation in his career!

At the University of Manchester from 1907, Rutherford and Geiger used alpha particles to explore the structure of the atom. Their student Ernest Marsden discovered the back-scattering of  $\alpha$ -particles from gold foil that led Rutherford to elaborate the nuclear theory of the atom in 1911. The hypothesis was mathematized by Niels Bohr in 1913 into its now-familiar

form. In 1917, Rutherford ‘split’ the nitrogen nucleus using  $\alpha$ -particles. After his return to Cambridge to succeed J.J. Thomson as Cavendish Professor in 1919, he and his students turned to the structure of the nucleus. By the time of his death in 1937, nuclear physics was changing into large-scale research – but all built on Rutherford’s earlier achievements.

### **From Rutherford to Nuclear Power**

*Dr Peter Iredale, ex-Director of Harwell*

In 1932 Chadwick first identified the neutron and showed it to be a neutral particle of mass almost exactly equal to that of the proton. It was rapidly adopted as a new fundamental particle and successful theoretical nuclear models were soon developed. Meanwhile neutrons were widely used experimentally and it was found that if they are slowed down to thermal energy by multiple collisions in some surrounding medium (moderated) the probability of interaction with target nuclei is greatly increased.

Hahn and Strassman in 1939 discovered that thermal neutrons induced ‘fission’ in uranium with a huge energy release. It was quickly established that  $^{235}\text{U}$  (only 0.75 abundant in natural uranium) is fissile, and that two to three neutrons are produced in each fission. Power plants using a ‘chain’ reaction appeared possible.

The pace of research and development was greatly accelerated for bomb purposes so that by 1945 200MW reactors for plutonium production were working and significant amounts of uranium enriched in  $^{235}\text{U}$  were available. A number of different types of power plant were developed. At present roughly three quarters of the world’s power reactors are water-moderated, water-cooled and use fuel enriched to contain a few percent of  $^{235}\text{U}$ .

After tea, the final two lectures were chaired by Prof. Alan Dronsfield, the Chairman of the RSCHG.

### **Radiochemistry at Harwell from 1946**

*Dr John Wilkins, Former Head of Site, Harwell, and Head of Chemistry Division*

When the Atomic Energy Research Establishment (AERE) was set up at Harwell in 1946 it was realised that there would be many chemical problems involving radioactive materials. A ‘state of the art’ building (B220) was designed, built on a short timescale and commissioned in 1949. B220 and other facilities allowed the safe handling of large quantities of radioactive material and were used for a wide range of chemical studies to support the growing UK nuclear industry. Initial work concentrated on the development of reprocessing plant for the separation of plutonium and the preparation of

plutonium metal. The chemistry of polonium was also extensively studied. Work expanded to cover the chemistry and preparation of reactor fuels such as uranium oxide and uranium/plutonium oxide and fundamental actinide chemistry. The first substantial stock of separated protactinium was produced as part of the actinide work. Radioactive waste treatment was an important part of the work at Harwell including the development of an understanding of the chemistry that might occur in an underground repository.

### **Curium and the Transactinides**

*Dr Clint Sharrad, Centre for Radiochemistry Research, Manchester University*

Element 96, a member of the actinide series with seven  $5f$  electrons, was first formed and characterized by Glenn T. Seaborg, Albert Ghiorso and James A. Ralph at Berkeley in 1944. It was named curium, after Marie and Pierre Curie, just as the analogous  $4f^7$  lanthanide element, gadolinium, was named after the Finnish chemist Johan Gadolin. Seaborg and Ghiorso went on to make numerous transuranic (and transactinide) elements with many of these elements also named after eminent scientists. Curium, specifically  $^{240}\text{Cm}$ , was first made by bombarding  $^{239}\text{Pu}$  with helium particles accelerated in a 60-inch cyclotron. Curium isotopes are known to exist between  $^{238}\text{Cm}$  and  $^{251}\text{Cm}$  and are most commonly found in spent nuclear fuel (SNF). The separation of curium from lanthanide fission products in SNF is of interest for the effective management of nuclear waste. The similar chemical properties of curium and the lanthanides make these separations very difficult, but a number of procedures have been developed. One of the few uses for Cm is as a precursor for the generation of transactinide elements in fusion reactions with heavy ions. Production rates in these reactions are extremely low and coupled with the very short half-lives found for most of the transactinide isotopes (30 s – 0.5 ms) makes characterisation of these elements extremely complicated.

Alan Dronsfield, in his concluding remarks, thanked all of the day’s speakers, and congratulated those who had made this meeting possible. He drew the attention of the meeting to some remarks made by Marie Curie at Vassar College, USA in 1921. Perhaps those who presently advocate the funding only of those scientific projects liable to result in wealth creation should heed her words:

We must not forget that when radium was discovered no one knew that it would prove useful in hospitals. The work was one of pure science. And this is a proof that scientific work must not be considered from the point of view of the direct usefulness of it. It must be done for itself, for the beauty of

science, and then there is always the chance that a scientific discovery may become like the radium a benefit for humanity.

The meeting concluded at 17.20, and was followed by a splendid reception sponsored by the RSC.

Alan Dronsfield and Bill Griffith

## FORTHCOMING MEETINGS

### Royal Society of Chemistry Historical Group Meetings

#### Dyes in History and Archaeology 30

This is a joint meeting with the RSC Historical Group, 12-15 October 2011.

The DHA meeting this year, in association with the Historical Group, will take place in Derby at the newly built eight million pound University of Derby Enterprise Centre on 12-15 October 2011. The format will be the same as in previous years. The Wednesday evening reception is followed by two days of oral presentations and posters and the Saturday excursion is to Matlock Bath for the Heights of Abraham, then coach transfer to Masson Historic Textile Mill Museum for a guided tour. The legendary conference banquet will take place on the Thursday in a former police station (Cathedral Quarter Hotel).

Registration costs £60 with optional extras for the pre-conference reception buffet on Wednesday 12 October (£10), the conference banquet on Thursday 13 October (£33) and the excursion on Saturday 15 October (£33).

**Deadlines:** registration by 9 September 2011; for a presentation, an abstract should be received by 15 July 2011.

Further details and the necessary forms can be found at <http://www.chriscooksey.demon.co.uk/dha/dha30.html>

Historical Group members may like to know what is discussed at DHA meetings. Although the 2011 seminar programme is still under discussion, a flavour can be obtained from this selection of topics which featured in the 2010 meeting in Lisbon:

The Orchil Trail: from Portugal and Angola (Isabella Whitworth). This paper detailed the activities of John Wilby, an agent in Lisbon of the Leeds dye manufacturer Wood & Bedford.

Indigo carmine: favoured but fading (Matthijs de Keijzer). This paper presented a complete history from the discovery (Johann Christian Barth, 1743) to the present day.

Kihachijō: an unusual, traditional Japanese yellow dye (Richard Laursen). This paper covered recent research into the dye obtained from the grass, *Arthraxon hispidus*, which revealed a rich mixture of yellow components, mainly heretofore unreported acid-stable flavanoid C-glycosides.

LC-ESI MS/MS study of pre-Columbian Peruvian textiles from the state ethnographic museum in Warsaw (Katarzyna Lech). This paper showcased a new method for structure determination of historic dyes

Chris Cooksey

### Environmental Chemistry: A Historical Perspective

Autumn meeting: Wednesday 26 October 2011

This joint RSC Historical Group and Environmental Chemistry Group meeting explores the lives and work of some of the early pioneers of environmental chemistry. In particular, the scientists who began the investigations into global atmospheric, marine, and terrestrial cycles which control our environment, and which dictate our current and future prosperity.

The meeting has been organised jointly by Rupert Purchase of the ECG and Peter Reed from the RSCHG. Our normal meeting fee of £10 this time includes, in addition to morning and afternoon tea and coffee, a buffet sandwich lunch at which participants can meet the speakers; we will also be holding during the lunchtime our AGM which members are urged to attend. Full details of the programme and a booking form are enclosed with this Newsletter: please register and send your remittance as soon as possible if you wish to attend.

Bill Griffith

### Society for the History of Alchemy and Chemistry Meetings

#### Academics, Consultants, Industrialists and Government Chemists: The History of Chemists' Careers in England, 1880-c.1960.

Autumn Meeting: Thursday 24 November 2011

This meeting will be held at St Hugh's College, Oxford. SHAC's AGM will be held before the meeting at 12.30pm. Following the AGM, lunch will be available at additional cost, with the meeting starting at 1.30pm.

Speakers: Robin Mackie, Gerrylynn Roberts and Anna Simmons, "The Changing Nature of Chemical Careers."

Bill Brock, "Contingent Careers: Armstrong, Crookes and Nicol."

Sally Horrocks, "Chemistry as a Career for Girls from World War II to the Sex Discrimination Act."

Viviane Quirke, "From Chemistry, to Pharmacology, to Biotechnology: Alfred Spinks's trajectory from wartime chemist to government advisor."

For further information on the meeting please contact Dr Anna-Marie Roos on [anna.roos@history.ox.ac.uk](mailto:anna.roos@history.ox.ac.uk)

A registration form will also be available on SHAC's website: [www.ambix.org](http://www.ambix.org)

Meeting Fee: £10 for SHAC members, £15 for non-members.

## **NEWS FROM THE AMERICAN CHEMICAL SOCIETY – DIVISION OF THE HISTORY OF CHEMISTRY**

### **Message from Tom Strom, HIST Division Chair**

This is my first report to you as HIST Chair. It is an honour to serve you as Chair, as it has been an honour to previously serve you as Chair-Elect. I joined HIST in 1990, when I realized that HIST didn't have the boring sessions that the other divisions did. I seem to have backed into HIST governance through arranging a history-based symposium at the Southwest Regional ACS meeting held in Fort Worth in 2004. After that I served as a resource for other chemists who were interested in arranging a chemical history session at an ACS regional meeting. Next I arranged a HIST symposium on "Landmark Stable Free Radicals of the Twentieth Century" for the Chicago ACS meeting in 2007. Somehow in 2008 I got elected to the position of Chair-Elect, and now here I am. The main impression that remains with me from these past few years is how devoted and able your HIST officers are. My thanks particularly go to Jan Hayes for her past two years as Chair, to Vera Mainz for her wise counsel, and to Paul Jones for his long, devoted service as Editor of the Bulletin. Fortunately we have an able replacement for Paul in Carmen Giunta.

Along with Paul Jones and Carmen Giunta, I served on the nominations committee. We had a fine slate of nominees, which, unsurprisingly, resulted in a fine slate of officers. The elected officers are as follows: Chair-Elect, Ned Heindel; Secretary-Treasurer, Vera Mainz; Councillor, 2011-2013, Roger Egolf; Alternate Councillor, 2011-2013, Joe Jeffers, Councillor, 2012-2014, Mary Virginia Orna; Alternate Councillor, 2012-2014, Arthur Greenberg. Other members of the Executive Committee are: Historian, James J. Bohning; Archivist, John Sharkey; Bulletin Editor, Carmen Giunta; Program Chair; Seth Rasmussen. I presume you are all aware that our elections are held every other year. There was some difficulty in getting a full slate of nominees. I hope you members will be open to possibly serving in the future. Division members should remember that there is some support

available from HIST for Executive Committee travel once a year to ACS meetings.

As I stated in my message last fall, my primary goal is for us to increase the numbers in and visibility of HIST. I hope all of you members will do your part by attending ACS meetings, giving papers in HIST sessions, and perhaps arranging or suggesting symposia. I would like to see you members promote HIST sessions or regionally-based symposia at ACS regional meetings. I was pleased to see an increase in the number of general papers for Anaheim. I hope this can be kept up for the meetings in Denver, San Diego, and New York.

Please contact me at ([tomstrom@juno.com](mailto:tomstrom@juno.com)) with your ideas, criticisms, and suggestions. I especially solicit feedback in advance of the Anaheim meeting, so that important issues can be part of the Executive Committee agenda. I look forward to meeting many of you in the future.

E. Thomas (Tom) Strom, HIST Chair

### **Message from Jan Hayes, HIST Division Past Chair**

Although Past Chairs usually do not have a message in the newsletter, I wanted to update members on the status of two projects I started while Chair. The first deals with the history of past ACS presidents. Many of us have been concerned that there is no listing of past ACS presidents on the current <http://www.acs.org/> website. As a project authorized by Immediate Past ACS President Joe Francisco, this is going to be changed. He is supporting the development of a new group of web pages called "Profiles of Past ACS Presidents", which will be rolled out at the Denver Fall 2011 national meeting. It will start with a basic page for each president including a photograph or portrait and biographical information. Additional information will be added as it is identified. A symposium will be held as part of the HIST program to share some of the past presidents' stories and an overview of trends in the lives of the presidents.

The second project was the San Francisco Spring 2010 symposium honouring Jack Stocker. This was followed by a similar symposium during the December 2010 Southeast/Southwest Joint Regional meeting in New Orleans. Both were successful and brought back many fond memories of Jack. His two sons have possession of his book collection. In New Orleans, we discussed the possibility of HIST working with them to establish a place for at least part of this collection in the Library at the University of New Orleans. I will continue to work with them on the logistics. We will be asking for your individual financial support for this project to be completed by the ACS National meeting in New Orleans in 2013. I hope you will aid in

this continuing effort. Thanks again for the opportunity to serve HIST the past two years.

Jan Hayes

### **American Chemical Society – Division of the History of Chemistry**

Offerings are subject to change. Please also check the HIST website - <http://www.scs.uiuc.edu/~mainzv/HIST/index.php> for updates.

### **San Diego, 25-29 March 2012**

**General Papers and HIST Tutorials.** (Seeking contributors) Seth C. Rasmussen, Department of Chemistry and Molecular Biology, North Dakota State University, Fargo, ND 58105, Phone: (701) 231-8747, Email: [seth.rasmussen@ndsu.edu](mailto:seth.rasmussen@ndsu.edu)

### **CALLS FOR PAPERS**

#### **Hazardous Chemicals: Agents of Risk and Change (1800-2000)**

Conveners: Deutsches Museum Research Institute; Department of History, Maastricht University; and Rachel Carson Center for Environment and Society

Location: Deutsches Museum, Munich, Germany

Date: 27-29 April 2012

The workshop will focus on the interaction between (a) the growing presence of hazardous substances in the economy and the environment, and (b) the cultural, scientific, regulatory and legal responses by modern society to these hazards. In each paper a specific chemical, or group of related chemicals, will take centre stage: from the start of its industrial production, via the proliferation of its uses, and the discovery of its effects on workers, consumers and/or on the biosphere, to attempts to control its emission and use, including the development of alternative products. The workshop will focus in particular on the history of specific chemicals which have had a profound impact on the way in which ecological and health effects have been perceived. Using a 'biographical approach' it will trace the entire 'life history' (production, use, problems, risk assessment, management strategies, and disposal) of those hazardous substances, culminating at the point at which legislative controls or alternative technical pathways were finally established. The focus will be on the main period of chemical industrialisation (ca. 1800-2000).

For the present we would like those interested in participating in the workshop to forward an abstract of the proposed paper, of approximately 600-800 words, as well as a CV. Please send these documents to the three organizers of the workshop:

Elisabeth Vaupel ([e.vaupel@deutsches-museum.de](mailto:e.vaupel@deutsches-museum.de)), Ernst Homburg ([e.homburg@maastrichtuniversity.nl](mailto:e.homburg@maastrichtuniversity.nl)) and Paul Erker ([Paul.Erker@carsoncenter.lmu.de](mailto:Paul.Erker@carsoncenter.lmu.de)) **before 1 October 2011** (revised deadline).

Papers will be pre-circulated and should be received no later than 15 February 2012.

### **FORTHCOMING CONFERENCES**

#### **8<sup>th</sup> International Conference on History of Chemistry (ICHC)**

##### **“Pathways of Knowledge”**

The Working Party (WP) on History of Chemistry of the European Association for Chemical and Molecular Sciences (EuCheMS) will hold its bi-annual International Conference on History of Chemistry (8<sup>th</sup> ICHC) in Rostock, Germany, from 14-16 September 2011. The 8<sup>th</sup> ICHC will focus on the theme “Pathways of Knowledge.” This theme is in direct connection to the general aim of the conferences organized by the WP, namely to facilitate communication between historically interested chemists and historians of chemistry from all over Europe. The second conference circular containing details of registration fees, accommodation and travel can be found at

<http://www.gdch.de/ichc2011>

Plenary Lectures will be given by Christoph Meinel: “Communication and discipline formation: Pathways of knowledge in nineteenth century chemistry”; Michael Gordin: “The rise and fall of Chemical Russian” and Robert Bud: “Stories about chemistry in the Industrial Revolution: Pathways towards what kind of knowledge?”

**Contact** - For questions concerning the local arrangements:

Caroline Kilb, Gesellschaft Deutscher Chemiker e.V., [c.kilb@gdch.de](mailto:c.kilb@gdch.de)

Gisela Boeck, Institut für Chemie, Universität Rostock at [gisela.boeck@uni-rostock.de](mailto:gisela.boeck@uni-rostock.de)