



Historical Group

NEWSLETTER and SUMMARY OF PAPERS

No. 69 Winter 2016

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From the Editor

Welcome to the winter 2016 RSCHG Newsletter. 2016 marks the 175th anniversary of the foundation of the Chemical Society of London, the oldest of the four predecessor societies of the RSC, the others being the Society for Analytical Chemistry, the Royal Institute of Chemistry and the Faraday Society. To mark this occasion, this newsletter contains an article by William Brock on the origins of the Chemical Society and the Pharmaceutical Society, which was also founded in 1841. I hope learning more about its foundation will encourage readers to join in the RSC’s commemorations of the event. Many of you will already know about the project 175 Faces of Chemistry and an exhibition open to the public featuring the 175 Faces will be held at Burlington House on weekdays from 22 February to 4 March 2016. The RSC would also like members to pledge 175 minutes for chemistry. Many members already give well over 175 minutes to RSC-related activities and with this initiative, the RSC wants to recognise this, support them and encourage others to do the same. More details can be found at:

<http://www.rsc.org/about-us/our-history/175-anniversary/#175-minutes>.

The spring RSCHG meeting will celebrate another anniversary, one hundred years since Gilbert N. Lewis published a paper entitled “The Atom and the Molecule”. This paper had an enormous influence upon many areas of chemistry and the meeting on Wednesday 23 March 2016 at Burlington House will cover Lewis’ overall contributions to chemistry and the interactions he had with his peers during his life. Full details on how to register for the meeting can be found in the flyer enclosed with the hard copy newsletter and also in the online version.

This issue contains a wide variety of news items, articles, book reviews and reports. Following William Brock’s article on the origins of the Chemical Society and the Pharmaceutical Society, Duncan T. Burns has written about

part of the career of one of the initial members of the Chemical Society, Frederick Penny, and some of the Glasgow poisoning cases in which he acted as an expert witness. The final short article is by John Hudson on the impact of the First World War on chemical manufacturing in Britain, with a study of the foundation and growth of the firm Scottish Dyes Ltd.

There are two book reviews in this issue. The first is of Anthony C. Cartwright's *The British Pharmacopoeia 1864 to 2014: Medicines, International Standards and the State* and the second looks at Geoffrey M. Bowers and Ruth A. Bowers, *Understanding Chemistry through Cars*. A report appears on the RSCHG meeting held at the Royal Institution in October 2015 celebrating the centenary of the award of the Nobel Prize to William and Lawrence Bragg for their work in X-ray crystallography. Reports also appear on the Tenth International Conference on the History of Chemistry held in Aveiro, Portugal, and on two new National Chemical Landmark Plaques, the first in Penzance where Humphry Davy (1778-1829) was an apprentice apothecary and the second at Lancaster Royal Grammar School, in honour of Sir Edward Frankland.

Finally, I would like to thank everyone who has sent material for this newsletter and apologise that it has appeared later than usual. I would also like to give particular thanks to the newsletter production team of Bill Griffith and Gerry Moss. If you would like to contribute items such as news, articles, book reviews and reports to the newsletter please do contact me. The guidelines for contributors can be found online at:

<http://www.chem.qmul.ac.uk/rschg/Guidelines.html>

The deadline for the summer 2016 issue will be Friday 10 June 2016. Please send your contributions to a.simmons@ucl.ac.uk as an attachment in Word. All contributions must be in electronic form. If you have received the newsletter by post and wish to look at the electronic version, it can be found at:

<http://www.rsc.org/historical> or <http://www.chem.qmul.ac.uk/rschg/>

Anna Simmons
University College London

Message from the Chair

This edition of the Newsletter has appeared later than planned. The delay was unavoidable, as the Editor, Anna Simmons, unfortunately became seriously ill last December. This resulted in a stay in hospital followed by a prolonged convalescence. As soon as she was fit enough she resumed work on the Newsletter, and I'm sure you will all agree with me that this edition is up to the usual high standard.

This is a good opportunity for me to thank Anna on behalf of the entire membership of the Group for her work on the Newsletter. Her efforts result in a publication of which we can be justly proud.

John Hudson
RSCHG Chairman

ROYAL SOCIETY OF CHEMISTRY HISTORICAL GROUP MEETINGS

“The atom and the molecule”: A symposium celebrating Gilbert N. Lewis

Wednesday 23 March 2016, Royal Society of Chemistry, Burlington House, Piccadilly, London

In 1916, Gilbert N. Lewis published a paper entitled “The Atom and the Molecule” that for the next century had enormous influence upon many areas of chemistry. To celebrate this centenary, we will be holding a one-day meeting with an introductory talk covering Lewis' overall contributions to chemistry and the interactions he had with his peers during his life. Other speakers will address areas such as the impact of his ideas on modern quantum mechanics and bonding across the spans of physical, inorganic and organic chemistry, how the modern chemistry text book and university courses have been built on this backbone, and how the working language of organic chemists in their synthetic and mechanistic explorations has developed from Lewis's concept of the shared electron bond.

Programme

- 10.30 Registration and tea or coffee
- 10.55 Welcome (Dr John Hudson, Chairman, Historical Group)
- 11.00 **First Session** – Chair: Henry Rzepa
Dr Patrick Coffey (Berkeley, USA)
Does Personality Influence Scientific Credit? Simultaneous Priority Disputes: Lewis vs. Langmuir, and Langmuir vs. Harkins
- 11.45 Professor Robin Hendry (Durham, UK)

Lewis on Structure and the Chemical Bond

12.15 – 13.45 Lunch

13.45 **Second Session** – Chair: John Hudson

Professor Alan Dronsfield (UK)

An Organic Chemist reflects on the Lewis Two-Electron Bond

14.15 Dr Julia Contreras-Garcia (UPMC, France)

Do Bonds need a Name?

14.45 Dr Nick Greaves (Liverpool, UK)

The Influence of Lewis on Organic Chemistry Teaching, Textbooks and Beyond

15.15 – 15.45 Tea Interval

15.45 Third Session – Chair: Robin Hendry

Professor Clark Landis (UWM, USA)

Lewis and Lewis-like Structures in the Quantum Era

16.15 Professor Michael Mingos (Oxford, UK)

The Inorganic Dimension to Lewis and Kossel's landmark contributions

16.45 Dr Patrick Coffey (Berkeley, USA)

Lewis' Life, Death and Missing Nobel Prize

17.15 *Concluding Remarks*: Henry Rzepa

17.20 Close of Meeting

REGISTRATION FORM

There is no charge for this meeting, but prior registration is essential. Please use the form below or the flyer included with the hard copy version of the newsletter and send it to Professor John Nicholson, 52 Buckingham Road, Hampton, Middlesex, TW12 3JG, jwnicholson01@gmail.com. **This is expected to be a popular meeting. If having registered, you are unable to attend, please notify Professor Nicholson.**

I wish to attend the HG meeting on 23 March 2016 at Burlington House, Piccadilly, London on “*The atom and the molecule*”: A symposium celebrating Gilbert N. Lewis.

Name.....

Address.....

Email..... Acknowledgement required: Yes/No

RSCHG NEWS

Following the RSC Historical Group meeting held on 18 March 2015 at Burlington House to celebrate the “Life and Work of Sir John Cornforth”, the following three articles have been published in the review journal *Science Progress*.

Rupert Purchase and James R. Hanson, “Sir John and Lady Rita Cornforth: A Distinguished Chemical Partnership”, *Science Progress*, 2015, **98**(3), 212-18.

Rupert Purchase and James R. Hanson, “Sir John Cornforth AC CBE FRS: His Synthetic Work”, *Science Progress*, 2015, **98**(3), 219-29.

Rupert Purchase and James R. Hanson, “Sir John Cornforth AC CBE FRS: His Biosynthetic Work”, *Science Progress*, 2015 **98**(3), 230-43.

MEMBERS' PUBLICATIONS

If you would like to contribute anything to this section, please send details of your historical publications to the editor. Anything from the title details to a fuller summary is most welcome.

Chris Cooksey, “Quirks of Dye Nomenclature. 5. Rhodamines”, *Biotechnic & Histochemistry*, 2015, **91**(1), 71 - 76.

<http://dx.doi.org/10.3109/10520295.2015.1074287>

Online access to this article for up to fifty colleagues can be obtained by following this e-print link

<http://www.tandfonline.com/eprint/49zp5aaZmy9hwnSaBJgH/full>

Rhodamines were first produced in the late nineteenth century, when they constituted a new class of synthetic dyes. These compounds since have been used to colour many things including cosmetics, inks, textiles, and in some countries, food products. Certain rhodamine dyes also have been used to stain biological specimens and currently

are widely used as fluorescent probes for mitochondria in living cells. The early history and current biological applications are sketched briefly and an account of the ambiguities, complications and confusions concerning dye identification and nomenclature are discussed.

RSC Historical Group member and former Treasurer, Peter Reed, has recently published *Entrepreneurial Ventures in Chemistry: The Muspratts of Liverpool, 1793-1934* with Ashgate. The Muspratt family form a fascinating dynasty in the history of British commerce and manufacturing. Associated principally with the development of the chemical industry in Liverpool - James Muspratt (1793-1884) was the first person to make alkali on a large scale using the Leblanc Process – the three generations of the family also contributed to wider Victorian and Edwardian culture through their interests in politics, education (founding the Liverpool College of Chemistry in 1848), art, literature and theatre. This is the first study to present the history of the Muspratts as a family group and to consider the entrepreneurial spirit they brought to chemical manufacture in Britain and to their many other ventures. A review of the book will appear in the summer 2016 newsletter.

Frank A.L. James, ed., Special Issue on X-ray Crystallography, *Interdisciplinary Science Reviews*, 2015, **40**(3).

This special issue marks the centenary of the awarding of the 1915 Nobel Prize for Physics to Lawrence and William Bragg for the work on X-rays. It includes articles by Jennifer Wilson on Dame Kathleen Lonsdale, Patience Thomson on her father Lawrence Bragg and C.R.A. Catlow on Modelling and Predicting Crystal Structures.

A.G. Davies, “Alexander Williamson and the modernisation of Japan”, *Science Progress*, 2015, **98**, 276-90.

Derry Jones, Review of P.W. Anderson’s *More and Different* has appeared in *Contemp., Phys.*, 2012, **53**(5), 454-5.

PUBLICATIONS OF INTEREST

Crystal Clear

A century ago in November 1915 William Bragg, just appointed Professor of Physics at University College London, and his son Lawrence Bragg, then serving on the Western Front, learnt that they had been awarded that year’s Nobel Prize for Physics. This was for their work, starting in 1912, in showing how X-rays could be used to determine the atomic structure of crystals, one of the key scientific discoveries of the twentieth century – more Nobel Prizes (including for the double helical structure of DNA) have been awarded for X-ray crystallography than for any other subject. Between 1923 and his death in 1942, William Bragg, as Fullerian Professor of Chemistry and Director of the Davy-Faraday Research Laboratory, built up at the Royal Institution the world’s most important X-ray crystallography laboratory.

Between 1954 and 1966 Lawrence Bragg held the same positions as his father had done at the Royal Institution. In addition, in 1965 he was created the first Director of the Royal Institution as recognition of his turning the organisation around after the Andrade crisis of the early 1950s. Both Lawrence Bragg and his wife Alice Bragg, wrote autobiographies, presumably with a view to publication which for various reasons did not happen during their lifetimes. Both are now published for the first time in an edition edited by A.M. Glazer (emeritus Professor of Physics at the University of Oxford) and Patience Thomson (Lawrence Bragg’s younger daughter). Lawrence Bragg’s autobiography covers his upbringing in Australia, service during the Great War, his time as Rutherford’s successor at the University of Manchester, Director of the National Physical Laboratory and then of the Cavendish Laboratory in Cambridge, ending just before his move to the Royal Institution. Alice Bragg’s covers her childhood in Manchester, as a student in Cambridge (where she met Lawrence), and then the same events, but from a rather different perspective, but including their time at the Royal Institution. Alice Bragg also records her own career, for example serving as Mayor of Cambridge at the end of the war of 1939 to 1945.

These two autobiographies in this single volume, published by Oxford University Press, provide enormously valuable insights into the development of science during the twentieth century and its place in broader culture and polity. Furthermore, the royalties from the book will be donated to the Royal Institution.

Fachgruppe Geschichte der Chemie Mitteilungen Nr. 24 (Frankfurt am Main: Gesellschaft Deutsche Chemiker, 2015). ISSN: 0934-8508.

The 2015 edition of the German History of Chemistry Group’s annual publication consists of nine short articles: the disputatious Berlin chemist Johann Heinrich Pott (1692-1777); a commemoration of the metallurgical chemist Christlich Ehregott Gellert (1713-95); a study of Julius Lothar Meyer’s textbook *Die moderne Theorien der Chemie*; an account of the strange tax problems of Ludwig Knorr (1859-1921) the professor of chemistry in Jena; a valuable account of the dyestuffs business founded by Joseph Weiler at Ehrenfeld in 1861; an examination of Kasimir Fajans and Oswald Göhring’s discovery of protactinium in 1913; a history of the Messel Pit World Heritage site that was worked for shale oil between 1885 and 1962; a technical account of the synthesis of I.G. Farben’s detergent “Mersolat” from coal; and, finally, an account of East and West German chemical dialogues in the 1960s. The articles are well-illustrated and accompanied by English summaries.

William Brock
University of Leicester

Mitteilungen Now Online

The History Group of the German Chemical Society is proud to announce that its journal *Mitteilungen* (as reviewed by William Brock above) is now online and openly accessible.

The content of all back issues from 1 (1988) to 24 (2014) is available from the Group's homepage:

<https://www.gdch.de/netzwerk-strukturen/fachstrukturen/geschichte-der-chemie/mitteilungen-der-fachgruppe-online.html>

Permanent electronic versions of the journal are hosted by the German National Library and linked in the Electronic Journals Library.

In this way the GDCh History of Chemistry Group hopes to improve its service, and to strengthen its ties, to the international community of historians of chemistry. The majority of articles in the *Mitteilungen* are of course in German, but it goes without saying that contributions submitted in English will also be considered for publication.

Christoph Meinel
Managing Editor

CAN YOU HELP? - Update from the summer 2015 newsletter

In the summer 2015 newsletter (*RSCHG Newsletter*, No. 68, p. 13) Doug Crump asked if anyone could identify the final photograph of notable chemists from a collection belonging to his late colleague, Tony Woolhouse. Ernst Homburg was happy to make the identification of the collection of photos complete

The person in the photograph was Luitzen J. Oosterhoff (1907-1974), professor of Theoretical Organic Chemistry at Leiden University, and between 1950 and 1967 a brilliant and inspiring research leader of the Shell research laboratory at Amsterdam. Ernst has spoken to several of his co-workers at Shell, who all agreed that he was one of the leading theoretical chemists in the Netherlands during the 1950s and 1960s. He was a part-time professor at Leiden between 1950 and 1967 and a full professor since 1967. His Shell-co-worker and Leiden-colleague Professor Joan van der Waals, now ninety-five years old, is still in very good shape and can tell more about Oosterhoff if needed.

The link below gives access to three biographical articles, unfortunately all in Dutch.

<http://www.biografischportaal.nl/persoon/62337762>

Feedback from the summer 2015 newsletter

Solvay Conferences

Reading Peter Reed's review of Kenneth Bertrams, Nicholas Coupain and Ernst Homburg's *Solvay: History of a Multinational Family Firm* prompted Derry Jones to write in about the series of international fundamental scientific-research conferences that Ernest Solvay founded (he also supported sociological and financial schemes). Prompted by Walter Nernst, Solvay financed an advisory Physics Council on Radiation and Quanta, under President H.A. Lorentz, in Brussels from 30 October to 3 November 1911 (other significant scientific meetings were occurring that September in Birmingham and Vienna). Speakers included Lorentz, Planck, the experimental spectroscopist Heinrich Rubens, Perrin, Nernst, and Einstein; others who accepted invitations included Sommerfeld, Wien, Jeans, Rutherford (who wrote a piece about the meeting for *Nature* and helped plan the next meeting), Poincare, Kammerlingh Onnes, Marie Curie, and Bohr's friend Martin Knudsen.

The Second Solvay Conference on the Structure of Matter, on 29-30 October 1913, was also under Lorentz. There were talks by von Laue, W.H. Bragg, Sommerfeld, Barlow, Pope and Brillouin, giving it a crystallographic emphasis (W.L. Bragg was not invited but was sent a postcard signed by everyone!); other attendees were J.J. Thomson, Rutherford, de Broglie, Wien, Nernst, Einstein, Langevin and Marie Curie. The proposed three-yearly sequence was interrupted by the 1914-18 War but resumed with the Third Solvay Conference in 1921 from which some Germans were excluded. Prominent participants included Lorentz, Ehrenfest, Langevin, Bragg, and Zeeman; ill-health prevented Niels Bohr's attendance, but a summary of his wartime work appeared in the published proceedings. Bohr was able to attend the Fifth Conference of the International Institute in 1927 on Electrons and Photons; it discussed the newly formulated quantum theory and, accordingly, Heisenberg, de Broglie, Schrodinger, Bohr and Planck were among the twenty-nine participants, mostly of Nobel or near Nobel level.

Solvay Conferences on Chemistry took place from 1922. William J. Pope chaired the Chemistry meetings up to 1934. W.L. Bragg ran a series from 1948 and A.R. Ubbelohde a series up to 1980. Crystallographic aspects are covered by Andre Autier in *Early Days of Crystallography* (Oxford: OUP, 2013) [Essay review by Derry Jones in *Contemp. Phys.*, 2013, 54, 287-290]; Discussion of the 1911 Conference and a photograph at the 1913 Conference

appear in Finn Aaserud and J.L. Heilbron *Love, Literature and the Quantum Atom* (Oxford: OUP, 2013) [Essay review by Derry Jones in *Contemp. Phys.*, 2014, 55, [3] 222-25.

Derry W. Jones
University of Bradford

Food Adulteration

Following the article in the summer issue on A.H. Allen and food adulteration, Denys J. Voaden, wanted to draw readers' attention to a passage in Mark Twain's *Life on the Mississippi* on the commercial 'benefits' of adulteration. Having discussed the markets from Cincinnati to Natchez for oleomargarine instead of butter, the passage continues by describing how American cottonseed oil was sold in place of olive oil.

There now, smell them, taste them, examine the bottles, inspect the labels. One of 'm's from Europe the other's never been out of this country. One's European olive oil, the other's American cottonseed olive oil. Tell 'm apart? 'Course you can't. Nobody can. ...We turn out the whole thing - clean from the word go - in our factory in New Orleans: labels, bottles, oil, everything. Well, no, not labels: been buying *them* abroad - get them dirt cheap there. You see, there's just one little wee speck, essence, or whatever it is, in a gallon of cottonseed oil, gives it a smell or a flavour, or something - get that out, and you're all right - perfectly easy then to turn the oil into any kind of oil you want to, and there ain't anybody that can detect the true from the false. Well, we know how to get that one little particle out - and we're the only firm that does. And we turn out an olive oil that is just simply perfect - undetectable!

Mark Twain, *Life on the Mississippi*, (Signet Co., 1961), 235-6, extract from p. 236.

NEWS AND UPDATES

Situating Chemistry—a free, on-line relational database for the history of chemistry

The Situating Chemistry database is now available on-line at:

<http://situatingchemistry.org>

The database stores biographical information on chemists and on others who were involved with chemistry as well as data on the sites where chemistry was practised, the networks of people, materials, processes and substances that circulated around them, chemistry (and other) courses and their audiences, together with events and organisations and the sources of the data. Associated documents and images can be stored in the system and also downloaded from it. The database is searchable and can be used to generate a wide range of reports, statistical analyses, tables, graphs, maps and animations. The mapping function allows us to superimpose local historical maps onto the contemporary world map and to chart the historical geography of chemistry from the international to the regional and local level. The user handbook, which is available on the home page of the website, explains how the database is structured, the conventions for data entry, data protection and security, and how to generate reports.

The database has been developed for the project Situating Chemistry which explores the interactions between the conceptual transformations of chemistry, its institutionalisation and the role of chemistry and chemists in innovation in industry and agriculture. Although developed for chemistry in the period 1760-1840, the database is not date-specific and can be used for any period in the history of chemistry and alchemy and for other sciences. We have designed it to be a research tool as well as for data storage and to support collaborative work and comparative studies. It is also publicly accessible and will, we hope, provide a means of bringing the work of historians of chemistry a much wider public.

Public access is view-only and is through the World Map, which flags up the locations of sites of chemistry. To view all the records in the system, to use the information and to contribute data you will need to open an account. To do so please go to the home page, click on *log-in* and then on create *an account* and follow the instructions—there is no charge for joining. At the same time, we would be grateful if you would send us an email telling us what your interest in the database is.

The system now contains 6,000 records, which reflect the research interests of those who have been developing the system. The next months will see the addition of a wider geographical and chronological range of data, new tools for generating reports and manipulating data and linkages to other databases, biographical and bibliographical. We are also in discussions to find a long-term institutional host for the database.

We have developed the system using open-source software, Drupal, rather than a commercial application to ensure that the system does not become outdated.

We are grateful for the financial support of the Netherlands Research Organisation and the Chemical Heritage Foundation.

For further information please contact the designers John Perkins, jperkins@brookes.ac.uk, and John Stewart, johnstewart@ou.edu.

John Perkins, Oxford Brookes University
John Stewart, University of Oklahoma

SOCIETY NEWS

Society for the History of Alchemy and Chemistry News

The Morris Award for 2015

The Society for the History of Alchemy and Chemistry is delighted to announce that Dr Anthony S. Travis of the Sidney M. Edelstein Center for the History of Science, Technology and Medicine at the Hebrew University of Jerusalem has been awarded the Morris Award for 2015 for his contributions to the history of the chemical industry (history of the dye industry and Henrich Caro) and the history of modern chemistry (history of chemical instrumentation and the history of groundwater pollution). Dr Travis gave the Morris Award Lecture, "Nitrogen Capture: The Emergence of a Global Industry, 1920-1935" after the SHAC meeting entitled *High Pressure in the Interwar Period*. The lecture and reception took place on Thursday 11 February 2016 at the Science Museum's Dana Research Centre and Library, 165 Queen's Gate, London.

Society of Chemical Industry News

90th Anniversary of the Formation of ICI

The Society of Chemical Industry (SCI) is considering marking the ninetieth anniversary of the formation of ICI which falls this year with an event in London for ICI alumni and a travelling exhibition aimed at the general public. For anyone interested in being involved with these activities more information and a questionnaire are available from Reshna Radiven at the SCI, either by email to reshna.radiven@soci.org or by post to, SCI, 14-15 Belgrave Square, London SW1X 8PS.

Julian Perfect
Hon. Librarian, SCI
Hon. Secretary, SCI London Regional Group

SHORT ESSAYS

175 Years of Institutionalised Chemistry and Pharmacy

175 years ago, on 23 February 1841, and following a preliminary period of canvassing by Robert Warington, twenty-five London chemists met at the Society of Arts in John Street, Strand, and agreed to form a committee to explore the possibility of forming a Chemical Society. When this provisional committee reported on 30 March, it was agreed, both Faraday and Sir John Herschel having declined, to appoint Thomas Graham (University College, London) as President. He was to be supported by four Vice-Presidents, William Thomas Brande (Royal Institution), John Thomas Cooper (a manufacturing chemist), J.F. Daniell (King's College, London), and Richard Phillips (pharmacist); two Secretaries, Edward F. Tescmacher (a manufacturing chemist) and Robert Warington (Apothecaries' Hall and the original instigator of the Society); and a Treasurer, the elderly Arthur Aikin (Guy's Hospital and Secretary of the Society of Arts). These officers were to lead a Council of a dozen men from both London and the rest of Britain, namely: Thomas Clark (Aberdeen), James Cumming (Cambridge), Charles Daubeny (Oxford), Thomas Everitt (Middlesex Hospital), Thomas Griffiths (St Bartholomew's Hospital), William R. Grove (London Institution), Henry Hennell (Apothecaries' Hall), George Lowe (a gas engineer and FRS), William Hallows Miller (Cambridge), William Hasledine Pepys (the instrument maker), Robert Porrett (War Office), and George Owen Rees (Guy's Hospital). Although the names of some of the twenty men will be unfamiliar today, sixteen (80%) of them were, or were subsequently, elected Fellows of the Royal Society and have entries in the *Oxford Dictionary of National Biography*. Another fifty-seven gentlemen who had been canvassed by Warington, agreed to join at the March meeting, so that the new society was duly launched with a membership of seventy-seven, forty of whom hailed from Scotland.

The March meeting resolved that the new society should be named The Chemical Society of London and that its purpose should be to hold regular meetings "for the communication and discussion of discoveries and observations, an account of which shall be published by the Society, in the form of Proceedings or Transactions". Of the more ambitious plans to form a library, museum of chemical samples and instruments, and a research laboratory, only that of the library was to bear fruit. (The museum was established, but it was sold off in 1865; and the need for a laboratory was rendered unnecessary by the creation of the Royal College of Chemistry in Oxford Street in 1845.) In a retirement speech in 1851, Warington suggested that his three objectives in founding the society were "to break

down part spirit and petty jealousies, to bring science and practice into closer communication [and] to bring the experience of many to bear on the same subject". Unlike previous learned societies, therefore, the Chemical Society had no specific research programme in mind; though, in practice, organic chemistry formed the bulk of the papers it was to publish in the early decades.

The Society instituted two categories of membership by personal recommendation and ballot. Ordinary membership was £2 for those residing within twenty miles of London and £1 for those further afield. (£2 would be about £180 in today's purchasing power; for comparison, the Royal Society charged its Fellows £4 per annum). These members were drawn from groups of professional and academic chemists who had hitherto been active in Section B of the British Association for the Advancement of Science, and manufacturers (many of who were active in calico printing, brewing and the nascent gas industry). Some of the latter, like Warrington himself, belonged to the Spitalfields Mathematical Society. In addition, members were drawn from the medical and pharmaceutical profession, and finally, a small miscellaneous group of clergymen and army officers. Right from the start, therefore, there was a social division within the society between "science and practice", a division that eventually led to rupture and the formation of the Institute of Chemistry some twenty-five years later and not to be healed until re-unification and the absorption of two other specialist societies to create the Royal Society of Chemistry in the 1970s. Ordinary membership, which included foreign chemists elected to honorary membership, was tightly controlled by the requirement of election by "personal knowledge". For Graham such members were ideally "high" chemists who had, and would, "prosecute the science with zeal and research".

Associate members, the alternative form of membership, did not have to pay any subscription for three years, at which time they were eligible for full membership. In practice, the number of associate member remained tiny and never rose above fifteen in 1844 when there were 149 ordinary members. The associate members, who had no voting rights, were expected to be "young gentlemen pursuing chemistry as a science, such as pupils, managers of manufactories" and so on. Once a Charter was obtained in 1848, the Society's ordinary members became "Fellows" and the society's title was shortened to the Chemical Society.

While the Chemical Society was organising, pharmacists were similarly creating a society to aid the training and employment of chemists and druggists, as well as the fostering of pharmaceutical knowledge and practice. Just a month after the formation of the Chemical Society, on 15 April 1841, the Pharmaceutical Society of Great Britain was established under the Presidency of the Quaker manufacturing chemist, William Allen. It obtained its Royal Charter earlier than the Chemical Society in 1843. The purposes of the two societies were quite different. The Pharmaceutical Society was created under political threat from general practitioners (the licentiates of the Apothecaries Society since 1815) to control the trade in drugs sold by retail chemists. The aim was to turn such chemists and druggists from tradesmen into professional pharmacists.

The Pharmaceutical Society was the creation of Jacob Bell at a meeting of interested chemists and druggists at the Crown & Anchor Tavern in the Strand on 15 April 1841. There had been several earlier short-lived associations of pharmacists hastily formed whenever the trade was threatened by restrictions or taxes – most notably when the Society of Apothecaries tried to control the trade between 1813 and 1815. Early in 1841 the Apothecaries had prosecuted a Liverpool druggist for administering drugs to a patient rather than just selling them to him. He was accused of practising as an apothecary (general practitioner) unlawfully since he had no medical licence from the Society. The *Lancet* thundered against "unlicensed prescription" and it seemed parliamentary legislation was imminent. For Bell this was an alarm bell! He saw clearly that pharmacists had to self-organise to protect their interests by instituting a uniform education for those entering the trade. The British needed to follow their European contemporaries where followers of Magendie, Pelletier and Liebig had created a scientific pharmacy based on the analysis and purification of materia medica. Only in that way would chemists and druggists achieve public confidence and be regarded as legitimate part of the medical professions. So, rather than as in the past, simply organising a political pressure group, Bell seized the opportunity to place pharmacy on a more scientific footing by facilitating the education and examination of future chemists and druggists so that their activities would be self-governing. In a word the trade would become a profession.

Bell's campaign had begun at his home in Oxford Street when he hosted "a pharmaceutical tea party" on 20 March 1841, the very week the Chemical Society was formally established. Like the latter, he created a committee that presented formal recommendations on 15 April. Better endowed than the chemists, within the space of a couple of months the new society had its own opulent premises in Bloomsbury Square (now the German Historical Institute and Library) and begun systematic teaching courses with a laboratory for practical work in the basement, and a library and museum. The Chemical Society had to wait until 1873 before it obtained its own premises in the government-owned Burlington House.

Although their purpose was distinct – the Chemical Society was a learned society while the Pharmaceutical Society was a qualifying association – 175 years later the historian can see a common factor in their separate foundations quite apart from a small overlap in membership. This was the common awareness of their founders that chemistry and pharmacy were lagging behind continental developments. In particular, both societies looked up to Justus Liebig as the trainer and breeder of a new scientific class of chemists and pharmacists who were empowered to transform agriculture and medicine as well as human well-being through industry. It was no accident that both societies elected Liebig to honorary membership in 1841.

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Romance, Murder and Mystery: Frederick Penny and the Murders by Poisoning in Glasgow

Frederick Penny: Training and Career

Frederick Penny (1816-1869) was born in London and suffered a childhood injury which affected his appearance and health for the rest of his life [1-3]. He was apprenticed at the age of fourteen to Henry Hennell, F.R.S., "Chemical Operator" to the Society of Apothecaries and during the latter years of his pupillage he received additional training at the Royal Institution under Brande and Faraday. In 1843, after he had settled in Glasgow, he visited Giessen and studied for a short time with Liebig. Penny's paper of 1839 on the determination of exact equivalent weights of chlorine, nitrogen, potassium, sodium and silver [4] brought him to the attention of Thomas Graham. The results were remarkably accurate, when seen by comparison of the value by Penny for silver of 35.45, that by J.S. Stas in 1860 35.457, and the current IUPAC value of 35.446.

Penny was appointed on the recommendation of Graham to the Chair of Chemistry in Anderson's University, Glasgow in 1839. At this time there was no salary attached to this Chair; the Professor collected fees from the students. As the number of students had fallen under the previous incumbent he was forced to augment his income elsewhere. He exploited his brilliant analytical skills in legal and commercial consultancy, building up the largest practice in the kingdom. In 1860 his income was said to be £6,000, £500,000 in today's money. By this time,

-18-

he had built up chemistry student numbers to be reputedly the largest in Britain [3]. All Penny's publications were related to practical problems, for example, he introduced potassium chromate as a titrant for Chromium (II) and for Iron (II) [5]; many others were published via the Annual Reports of the British Association, as was common by academics at the period.



Fig. 1. Portrait of Frederick Penny

The last few months of Penny's life were made bitter by the proposed endowment of a Chair of Technical Chemistry by the President of the University, James Young, which appeared to Penny to threaten his income and

indeed his reputation [3]. This was a great pity because Penny's analytical skills had helped found Young's fortune in defence of Young's paraffin oil patents, and in the Torbanehill case [6]. The key question that arose at the trial was whether the mineral mined was "coal or not coal". In Irvine Smith's report, Penny's written evidence reads like a modern affidavit, of nine chemists called, he was the last chemist put up by the defence on the principle, "save the best till last". The coal distilled at low temperature and yielded paraffin oil. Penny was also involved in various cases concerned with the public water supplies for Glasgow. Penny did much for medical jurisprudence and his appearances in the witness box "unfailingly heralded some positive triumph of chemical science". Two cases are of particular note, the first being the trial of Madeleine Smith [7-10], the second being that of Dr Pritchard [11].

The Trial of Madeleine Smith

Madeleine Smith was the daughter of a successful Glasgow architect, who designed, the Royal Exchange, Bellahouston Church, Overtoun House and many others. She had an affair with Pierre Emile L'Angelier, a clerk from Jersey, who had made several previous attempts to marry money. Her father forbade the affair which however continued clandestinely via meetings and about 300 letters, many of which were very explicit. The relationship cooled when she was pursued by William Minnock, a rich and respectable banker and a more suitable suitor. The move of the Smith family to Blythswood Square is important. As Madeleine's room was on the lower floor, this permitted the clandestine relationship to continue, with letters and hot drinks passed via the bedroom window.

The nine-day trial of Madeline, who was charged on three counts, one of murder and two of attempted murder of L'Angelier, was a sensation as her explicit love letters were read in court [7]. Her defence lawyer portrayed her as an innocent, seduced by a blackmailer. The key point in Madeleine's defence was the successful objection by her advocate John Inglis (Dean of the Faculty) to the contents of L'Angelier's memorandum book being read; there was thus no evidence that she had met L'Angelier just before the dates of his two illnesses.

From Penny's evidence there was no doubt about the cause of death, arsenical poisoning. There was a delay at the start of the trial due to the late arrival of Penny. He was called into court and reprimanded for his "singular disregard of the orders and form of the citation" which required his attendance at 10.00 am, not 12.15 pm. However, at the end of his lengthy evidence and cross examination he was commended by the same judge, "Dr Penny, more satisfactory lucid or distinct evidence I have never heard". Penny used no less than four confirmatory tests for arsenic. She was found not guilty on the first charge of murder and "not proven" by a 2:13 majority verdict, on the second and third charges, those of attempted murder. Despite evidence of her purchase of arsenic and tartar emetic, recorded in several pharmacists' Poisons Registers.

After the trial Madeleine moved to London, married the artist George Wardle on 4 July 1861, and entered the fringes of the Pre-Raphaelite movement when her husband became William Morris's manager. Details of her previous life were well known to the artistic community in London, occasioning some jokes about whether it was safe to eat dinner at the Wardles. A playlet was written by Dante Gabriel Rossetti about Morris, the Wardles, arsenic and tea. "The Death of Topsy" [8],

its sub-title was "A Drama of the Future in One Unjustifiable Act". Her husband died in 1910 and she moved to New York to be near her son. She married a second time to William A. Sheehy, who died in 1926. Madeleine died in New York in 1928. The trial of Madeleine has produced a vast literature, several plays, films and web-sites [9, 10].

The trial of Dr Edward William Pritchard

As for the trial of Madeleine Smith a complete record exists of the trial of Dr Pritchard [11]. Pritchard (1825-1865) qualified medically in 1846 and first practised as an assistant surgeon in the Navy, then as a private physician to a traveller to the Holy Land. In 1850 he married Mary Jane Taylor and, with his father-in-law's help, he set up in general practice in Yorkshire, first at Hunmanby, then from 1854 in Filey. They moved to Edinburgh in 1859, then in 1860 to Glasgow and settled at 11 Berkeley Terrace.

Late on the night of 5 May 1863 there was a fire at the Pritchard's house in which a servant Elizabeth McGirn perished. Pritchard was suspected of starting the fire to cause McGirn's death as it was likely she was pregnant, but the matter was not pursued. To avoid the scandal, he moved to 22 Royal Crescent. In May 1864 Pritchard purchased, with the aid of a loan from his mother-in-law, the medical practice and house at 131 Sauchiehall Street. He had by now seduced their fifteen-year-old servant Mary McCleod and procured an abortion for her.

In November 1864 his wife became ill and went to stay with her mother in Edinburgh to recover but became ill again upon her return. Her mother came to Glasgow to nurse her. Mrs Taylor died on 25 February 1865 after eating tapioca pudding; Pritchard signed the death certificate attributing the death due to a stroke. Mrs. Pritchard died on 17/18 March 1865 and Pritchard certified death as gastric fever. The Procurator-Fiscal received an anonymous letter dated 18 March accusing Dr Pritchard of causing the two deaths. This was probably sent by Dr James Paterson who had refused to sign the two death certificates.

The trial began on 3 July 1865 and lasted five days. The body of Mrs Taylor had been exhumed and *post mortem* examinations carried out by Professor Douglas MacLagan and Dr Henry D. Littlejohn, who also undertook the chemical analyses of the organs of both bodies. Antimony was found in most of Mrs Pritchard's organs with mercury in some. Samples were sent to Professor Penny who also found antimony by the Reinsch and the Marsh

procedures. Mrs Taylor's organs were examined with similar results. Mrs Taylor had been in the habit of taking "Battley's Sedative Solution", an opiate solution, for neuralgia.

Penny was also supplied with a vast number of items from the Pritchard household. In a sample of tapioca, he found soluble tartarised antimony. From the Battley's solution he isolated aconite, detected by the effects on the tongue (prolonged numbness). He, along with Dr James Adams, experimented with rabbits, determining the composition of the Pritchard's sample of Battley's solution by examining its effect on rabbits with those of a series of mixtures of genuine Battley's and Fleming's solution of aconite. This was the first time that the result of a bioassay was presented in court. Evidence from pharmacists' records was provided showing Pritchard's purchases of tincture of aconite and of tartarised antimony. The verdict was guilty and the sentence, death by hanging passed. Four days after his conviction he confessed to his crimes. He was hanged in front of Glasgow Gaol on 28 July 1865, over 100,000 attended what was to be the last public execution in Scotland.

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"I will let that man see yet whether weavers can make dyes!"

World War I and the formation of Scottish Dyes Ltd

The centenary of the outbreak of World War One has provided opportunities for historians to consider the impact of the conflict on chemical manufacturing in Britain [1]. This essay describes how the outbreak of war resulted in the creation of a completely new chemical company by a man who had no previous chemical experience. The company he founded rapidly became a major player in the field of dyestuffs manufacture [2].

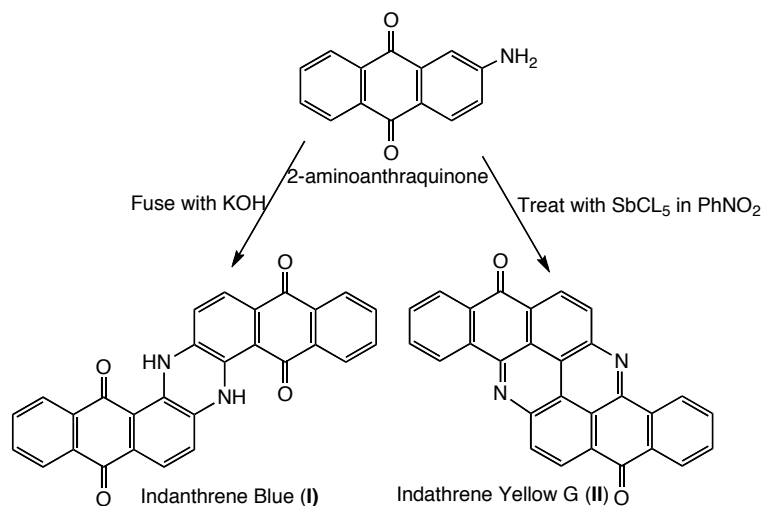
The story commences back in the nineteenth century, when Alexander Morton founded a weaving business in the village of Darvel in Scotland. The company prospered, and in 1900 it expanded by opening factories in Carlisle, with one of Alexander's sons and a nephew (both called Guy) in charge. In 1902 they were joined by James, another of Alexander's sons, who soon set about trying to improve the company's products. The fabrics they produced were very susceptible to fading in sunlight or when washed, so James commenced experiments in which samples of fabrics treated with all the various dyes he could obtain were exposed to sunlight in the greenhouse of his home in Penrith. He also sent samples to his brother in law in India to be tested in a similar manner. By 1904 he had found a range of dyes with which he was satisfied. Alizarines were good for reds and deep wine colours, and traditional inorganic mineral colouring matters gave buffs and light browns. These could be sourced from this country, but satisfactory blues and greens had proved a more difficult problem. However, BASF had recently introduced to the market the first synthetic anthraquinone vat colours – Indanthrene Blue and Indanthrene Yellow G (structures **I** and **II**), which in combination gave green. In the vat process, the insoluble dyes were reduced in alkaline solution to the soluble leuco forms, applied to the fibre, and then oxidised back to the coloured compounds. Morton started to import the new dyes, insisting that the Glasgow company that dyed the yarns for his looms used

only his selected dyes, and also supplied yarns dyed in this way to his company alone. He placed his new fabrics on the market, guaranteeing them against fading, and coined the trade name *Sundour*.

Although the products were expensive, the business prospered. Morton was BASF's largest customer for the new compounds, thereby creating a level of demand which stimulated the German company to develop further new anthraquinone vat dyes. This in turn enabled Morton to extend and improve the colour range of his Sundour fabrics. In 1909 he embarked on a new venture, namely to dye at Carlisle pre-woven material (piece dyeing). This had never previously been achieved with the new dyes, and it signalled Morton's introduction to chemical technology. He hired the best person he could find to develop the process in the laboratory and design the dyeworks. This was an Austrian by the name of Dr Teltcher, who was a PhD of Heidelberg, and who had also followed tinctorial and textile courses at Manchester.

By June 1914 the new fabrics had become so successful that it was decided to divide the business, forming a separate company in Carlisle called Morton Sundour Fabrics Ltd. (MSF). James Morton was in sole charge of the new company, his brother and cousin (the two Guys) having by now left to pursue other interests. Almost simultaneously, Archduke Ferdinand of Austria was murdered in Serbia, and on 4 August, Britain declared war on Germany.

Morton immediately turned many of his looms over to weaving blankets for the army, but orders still kept coming in for Sundour fabrics, and he was determined to keep that side of the business alive. However, he only had five months' supply of the imported German dyes in stock. Although he could revert to using some of the dyes he had employed when he originally launched Sundour, a supply of Indanthrene Blue and Indanthrene Yellow G remained essential. He knew that they were synthesised from 2-aminoanthraquinone, which in turn was derived from "silver salt" (the sodium salt of anthraquinone-2-sulphonic acid) used in the manufacture of alizarine. But, as he later recounted, at this time chemical names such as 2-aminoanthraquinone were complete Hebrew to him. He approached the British Alizarine Co and other dye manufacturers to see if they had started manufacturing anthraquinone vat dyes from silver salt, but they had not and had no intention of so doing. When Morton indicated he might try to make the dyes himself, the dye manufacturers reacted with both astonishment and amusement.



But Morton was not to be dissuaded. He said of the head of one dyestuffs company "I will let that man see yet whether weavers can make dyes!" He engaged a chemist in London who obtained details of the processes from the Patent Office Library. Had Morton been in possession of more chemical knowledge, he might have become disheartened by the difficulties that lay ahead. Dr Tetchler, who would doubtless have been of considerable assistance, had returned to Austria immediately prior to the outbreak of hostilities in order to avoid being interned. However, Morton did have the help of his head dyer, another Austrian called Rudolf Hübner, who was himself interned immediately after the start of the war, but fortunately was soon released under strict conditions.

Morton managed to obtain a batch of silver salt from the British Alizarine Co, but this needed to be treated with ammonia at a temperature of 180-200°C at 40-50 atmospheres pressure to convert it to 2-aminoanthraquinone. Fortunately, he had a small laboratory autoclave (1.5 litre capacity) and with this he and Hübner achieved the conversion. To obtain the dyes, 2-aminoanthraquinone had to be fused with caustic potash to obtain Indanthrene Blue, or treated with antimony pentachloride in nitrobenzene to obtain Indanthrene Yellow G. By early November 1914, they had used their small batch of 2-aminoanthraquinone to prepare a few grams of each of the yellow and the blue dyes. But scaling up presented serious problems. Large autoclaves were not available, and the first made to Morton's order was rejected when it failed its hydraulic test. In desperation he managed to get a local engineering company to fabricate an autoclave using seamless steel tubing obtained from a boiler manufacturer. The first use of this "homemade" autoclave took place in March 1915, and resulted in enough 2-aminoanthraquinone to produce 20 lbs of the dyes. Morton immediately ordered autoclaves from Sheffield, firstly of 8 cwt capacity and subsequently of 1 ton.

Morton was now committed to becoming a dye manufacturer as well as a weaver. The progress he had made in less than eight months after the outbreak of war was truly remarkable, but he now needed to employ chemical experts. Early recruits were a female chemist, Grace L. Reynolds, Arthur Davies MSc, who had several years' experience working at BASF, and Robert Fraser-Thomson, who had recently completed his doctorate under Professor William Jackson Pope at Cambridge. They were joined in late 1916 by another of Pope's former doctoral students, John Thomas, who proved to be not only an excellent research chemist but to possess great managerial ability. Morton soon put him in charge of the entire dye-making operation, which in spite of wartime difficulties, grew rapidly. A year later the team of chemists numbered ten, and it was to continue to grow thereafter.

There was plenty for the chemists to do. The dye manufacturing required chemical supervision, the purity of the products had to be checked, and the application of the dyes also needed the expertise of the chemists. But a new problem arose immediately, because Morton was unable to buy further batches of silver salt. The only solution was for MSF to make it themselves from anthracene. Commercial anthracene was supplied only forty percent pure, and after purification to ninety-five percent it had to be oxidised to anthraquinone, which itself had to be purified. This was then sulphonated with oleum (which was difficult to obtain in wartime) to give silver salt. But the team of chemists also investigated the possibility of producing some of the other new vat dyes first synthesised and marketed by BASF, and which had been introduced into the Sundour range in the preceding few years. In this they were successful. Another achievement was the introduction of the manufacture of Alizarin Sapphirole, an acid blue dye widely used on woollen materials, and much missed when imports from Germany were stopped. By 1916 the company was using the Carlisle produced dye in their own carpet dyehouse. The company also wished to produce vat dyes derived from benzanthrone, and the chemists succeeded in developing the production and purification of this intermediate.

The Carlisle operation remained fairly small, supplying the needs of MSF and a few other customers. But the production at Carlisle became more widely known after November 1916 when another dyemaking company proudly announced that it had succeeded in producing Indanthrene Blue, and that it was the first British firm to do so. This stung Morton into publicising the fact that his company had been manufacturing the dye, and others in the range, for eighteen months. He made this announcement because he said he owed it to his chemists that their successes should be recognised. This publicity had the effect of drawing national attention to the Carlisle manufacture, and orders increased hugely.

The rapid expansion of production resulted in the formation in 1917 of a new company, Solway Dyes, which was a wholly owned subsidiary of MSF. By the end of the war it was obvious that Morton was now in a position to become a major player in the dyestuffs industry, but his site at Carlisle was totally incapable of expansion, so he purchased eighty acres of land at Grangemouth in Scotland. Construction of a new factory there started in 1919, and in order to finance that venture Solway Dyes became a public company, Scottish Dyes Ltd., which was wholly independent of MSF.

It was known that a simpler route to anthraquinone was possible from phthalic anhydride by reacting it with benzene under Friedel-Crafts conditions to yield 2-benzoylbenzoic acid, which was then converted to anthraquinone by dehydration. This obviated the need to use expensive and impure anthracene. The best route to phthalic anhydride was the catalytic air oxidation of naphthalene, but the rights to this process were owned by an American company. Morton travelled to the USA in 1919, and secured the British rights for the huge sum of \$200,000. On his return he was dismayed to learn that a legal ruling (the Sankey judgement) had resulted in German firms being able to export dyes to Britain at low cost for a year, thereby undercutting British manufacturers. British consumers of dyes purchased large stocks, and some dyestuffs manufacturers laid off chemists at this time (known as the "dump and slump" period), but Morton, bullish as ever, set his chemists to concentrate on research. He urged them on by placing plaques on the wall of the Carlisle research laboratory, with the quotations "Rather I would discover one fact, than become King of the Persians" (Democritus), and "Unless a man has a good hope, he shall not find out the unexpected" (Heraclitus).

Morton's encouragement soon bore fruit. A fast green vat dye had long been sought, for the mixture of yellow and blue gave a somewhat dull shade. In 1920 the Carlisle chemists, starting from benzanthrone, synthesised Caledon Jade Green, which was to enjoy enormous success for many years. Indeed, representatives from BASF, from whom Morton had purchased dyes before the war, travelled to Britain in 1925 to negotiate a licence to produce the dye in Germany. Another triumph was the discovery that when using phthalic anhydride as the starting material it was not necessary to isolate anthraquinone; it was possible to convert 2-benzoylbenzoic acid directly into any intermediate for which anthraquinone was formerly used.

The Carlisle factory closed in 1929. The most famous achievement of Scottish Dyes Ltd at Grangemouth resulted from an occasion when a batch of phthalimide, made by passing ammonia gas into molten phthalic anhydride, was found to be contaminated by a blue material. Four of the chemists originally recruited at Carlisle (Dandridge, Drescher, Dunworth, and Thomas) investigated the blue substance and found that it contained iron which had originated from the reaction vessel. They soon discovered that similar compounds containing other metals could be prepared. These compounds belonged to a new chemical class, and the copper compound (copper phthalocyanine or Monastral Blue) had outstanding properties as a pigment.

In 1928 Scottish Dyes Ltd became part of British Dyestuffs Corporation, which shortly became part of the newly formed ICI. In February 1929, less than fifteen years after the outbreak of war, Morton gave a lecture in which even he seemed to be stunned by the rapid progress which had been made. He said "...I sometimes rub my eyes even yet, and wonder if it is not all a dream and if it is really true that one has been responsible for what is now known as Scottish Dyes, with its huge buildings and railway avenues spreading across fifty odd acres of land, dealing with thousands of tons a year of raw products to be converted into intermediates and dyestuffs of the most complicated types, by dozens of skilled chemists, with hundreds of chemical process men, and employing something like a million sterling of good capital".

Morton can be forgiven for his lack of modesty, for the creation of his dyestuffs manufacturing company under the difficult conditions of wartime was a huge achievement, and the subsequent success of the business was truly remarkable. He was knighted in 1936, and died in 1943.

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BOOK REVIEWS

Anthony C. Cartwright, *The British Pharmacopoeia 1864 to 2014: Medicines, International Standards and the State*, (Farnham: Ashgate, 2015). Pp 243, ISBN: 978-1-4724-2032-9, £70 (hardback).

In 2014 the *British Pharmacopoeia* celebrated its 150th anniversary and this publication provides the first in-depth history of its development up to the present day. The author has made extensive use of the minutes of the Pharmacopoeia Committee and other committees of the General Medical Council from 1863 to 1970, in addition to the minutes of the British Pharmacopoeia Commission from 1932, to tell the history of this publication. In bringing these sources together, the author provides a rich resource for anyone who is interested in how individuals, institutions and politics shaped the production of the *British Pharmacopoeia* and his chronological approach makes it easy to locate relevant information.

The book is divided into three parts. The first section "Origins, Development and Maturity" begins with an examination of early pharmacopoeias including those published in London, Edinburgh and Dublin, before charting the history of the *British Pharmacopoeia* in three periods, Early Years (1864-1914), Middle Years (1914-1968) and Later Years (1968-2014). Part II examines the *British Pharmacopoeia* in International Context, exploring its complex relationship with the *European Pharmacopoeia* and then, as pharmaceuticals became increasingly globalised, how there was increased pressure for national and regional pharmacopoeia commissions to collaborate and harmonise. The final part, entitled "Continuity and Change" has perhaps the most widespread appeal, as it examines changes in therapeutics and analytical methods in the period 1864 to 2014. This section includes a discussion of how monographs for drugs included in the early editions of the *British Pharmacopoeia*, such as quinine, digitalis and opium, have evolved. It also includes a commentary on the monographs and discoveries of a selection of the top twenty drugs ranked in order of the numbers of prescription items dispensed in the community in 2013, including bronchodilators, statins and anti-depressants.

Pharmacists and pharmaceutical historians are the key market for this book, but for those interested in the history of chemical analysis and standardisation, it is perhaps a shame that the pharmacopoeia's nineteenth century links with the chemical community are not explored further. For example, Robert Warington's joint editorship of the 1864 *British Pharmacopoeia* is given little reference and even his name is incorrectly spelt. Unfortunately, the publication can also be rather dry in places, particularly when summarising the content and personnel associated with recent annual editions of the *British Pharmacopoeia*. The book would also benefit from a concluding chapter to highlight common themes from the three parts rather than relying on simply bringing the reader up to date with the situation in 2014 in each section. Such a conclusion would also enable more consideration to be given to the wider historiography, especially with regard to medical regulation and the evolving pharmaceutical marketplace. Nevertheless, this is a meticulously researched and informative account of the *British Pharmacopoeia's*

history and its role as a global reference for the quality of medicines which will be an important resource for medical and pharmaceutical historians.

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Geoffrey M. Bowers and Ruth A. Bowers, *Understanding Chemistry through Cars* (Boca Raton, FL: CRC Press, 2015). Pp. 245, with illustrations and photos. ISBN: 978-1-4665-7183-9 (Paperback). £25.99.

It is always interesting and informative to read a book about the role of chemistry in a major consumer product and the car (or automobile as this book often refers to it) is probably the most pervasive of such products alongside food. For most owners of cars their technical or chemical understanding is in most cases probably fairly minimal; their main interaction is to just unlock the car, get in, put their seat belt on, start the engine, engage a gear and drive. The technical function of the car is just taken for granted until something goes wrong (no drive, no gears or a mechanical or structural failure) and then it's just a matter of getting the car towed into a garage for repair. Even those with a good knowledge of chemistry are unlikely to be thinking about the science bearing on the appearance and operation of their car; it is just taken for granted. This book by Bowers and Bowers (Geoffrey is a car enthusiast and Ruth is an educationalist) is an attempt to explain the important and essential part chemistry plays.

The book is divided into a number of chapters, each taking a theme that allows the authors to 'hang' detailed information about an aspect of the chemistry (and often the engineering) of a car. The chapters include: the properties and behaviour of gases; combustion, energy and the internal combustion engine; oxidation and reduction; intermolecular forces; managing heat; materials chemistry; light and your car. There are also five appendices where background technical information is provided to help readers who do not have a good understanding of chemistry to appreciate the points covered in each chapter.

While the book does not provide a history of the chemistry of cars, each chapter shows the technical developments that have taken place in recent times, and perhaps more importantly sets out the future direction of technical advance. Opportunities are also taken to show the technology transfer from state-of-the-art Formula One racing cars and sports cars to the domestic car, a link that has often been rather unclear.

Taking one chapter in more detail will show how themes are developed. Chapter 3, Oxidation and Reduction, covers REDOX reactions that affect cars. It starts with a summary of the principles of redox reactions and the redox activity series before going on to explore the composition of batteries and their operation (and why batteries struggle in the winter), hydrogen cell technology (and its introduction into some recent models), catalytic converters (their role, function, potential damage and need for improvements to reduce exhaust emissions), rust and corrosion (their science and the use of paint and coatings for prevention) and chrome plating (principles of electroplating, and both functional and decorative plating).

This is probably a book that should be read by all owners of cars but many of the technical details will remain elusive without a clear understanding of chemistry, an understanding that goes beyond the appendices. Nevertheless, owners of cars with a good understanding of chemistry will find many fascinating details in this book and make it a worthwhile read. It would certainly aid those pursuing apprenticeships in vehicle engineering and maintenance. Teachers in schools and colleges would find the book as a very useful study guide with which to show students the relevance of chemistry to a product in everyday use.

Peter Reed

RSC NATIONAL CHEMICAL LANDMARKS

Humphry Davy Chemical Landmark Plaque erected in Penzance

In April 2015, the Historical Group Committee recommended an RSC Chemical Landmark plaque for the building in Penzance in which Humphry Davy (1778-1829) was an apprentice apothecary from 1795 to 1798 (No. 1, Market Place). The recommendation was accepted by the RSC Outreach team. The plaque has now been installed following a most successful ceremony in The Exchange, an art gallery a few tens of metres from the building. The ceremony, which took place on Thursday 17 September 2015, was funded by RSC Outreach. The author of this report acted as master of ceremonies on behalf of the Historical Group Committee.

The main features of the ceremony were, firstly, a lecture by Professor metres from the building. The ceremony, which took place on Thursday 17 September 2015, was funded by RSC Outreach. The author of this report acted as master of ceremonies on behalf of the Historical Group Committee.

Frank James [1], entitled " 'the place of my nativity': The role of Cornwall in Davy's life", and secondly, the presentation of the plaque itself by a past-president of the RSC, Professor Jim Feast, CBE, FRS to the owners of the

building, represented by Mr Jon Symons, JP. Other speakers were Ms Susan Stuart, of the local Humphry Davy Project, and Councillor David Nebesnick, Mayor of Penzance.

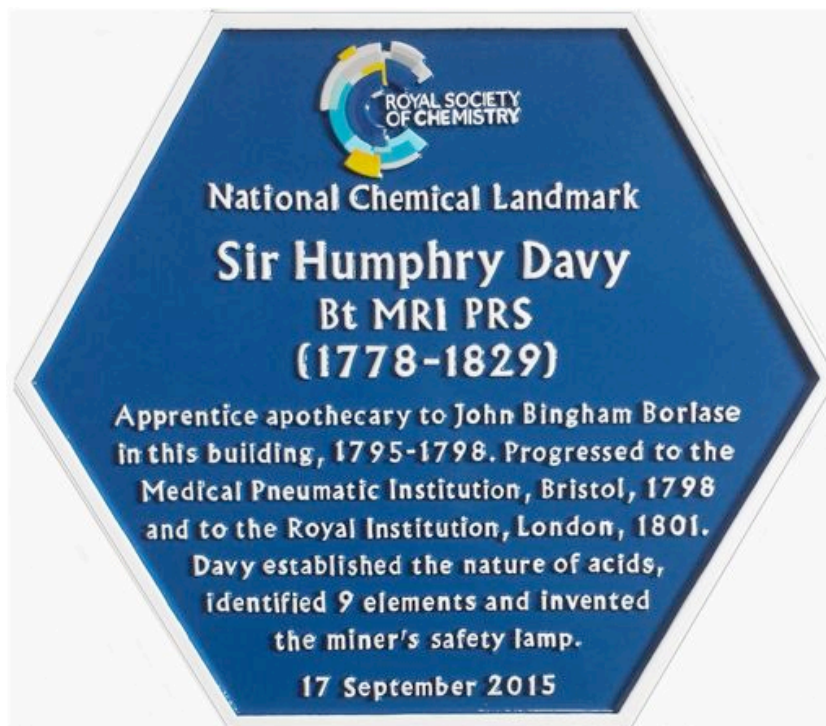


Fig. 1. The plaque in close-up

The RSC Chemical Landmark plaques seek to make the general public aware of historic chemists – and thereby of the importance of chemistry in society and of the RSC. In this case, the townspeople of Penzance were already very aware of Davy as “Penzance’s most famous son”, but this if anything seems to have increased their enthusiasm for the national recognition provided by the plaque. The forthcoming ceremony was “trailed” twice at length by the local newspaper, *The Cornishman*, and also by Radio Cornwall in the breakfast programme on the day. A reporter and photographer were sent to the ceremony by *The Cornishman*; the resulting report, under the headline “Royal Society of Chemistry travels to Penzance to deliver Humphry Davy plaque”, comprised a substantial account of the event and the background and a group photograph.



Fig. 2. The plaque installed, with the existing statue of Sir Humphry Davy to the right. The photograph is taken along Market Jew Street, which narrows at the junction with the side street to the left (New Street) and becomes Market Place.

Pre-existing local recognition of Davy takes various forms: an imposing statue of Davy; the local Humphry Davy Project already mentioned, which seeks to inspire youngsters through the example of Davy; and the naming of the

local comprehensive school for ages 11-16. The building, No. 1 Market Place, has in one of its display windows a mural depicting Davy at work.



Fig. 3: Group photograph taken shortly after the presentation. Left to right, Head Girl Jodi, David Nebesnuick, Jon Symons, Jim Feast, Frank James, Head Boy Harry, Michael Jewess.

The venue for the ceremony was fully occupied with about forty people. Attendees included the following: Lord St Levan, the occupant of St Michael's Mount, the spectacular island in the nearby bay; the pharmacist who while a tenant of the building had commissioned the mural (Mr Jim Saulter); the artist of the mural (Mr Tim Wright); and the Head Boy and Head Girl of the Humphry Davy School.



Fig. 4. The Davy mural, commissioned by Jim Saulter and executed by Tim Wright. Since this photograph was taken, the date “1794” has been corrected to agree with the date on indenture in possession of the Royal Institution and with the Chemical Landmark plaque.

No. 1 Market Place continued as a pharmacy after the time of Davy. From the 1830s for many years it was run as “Symons”, *ie* by the same family as the present owners; latterly it traded as “Peasgoods”. Peasgoods relocated to another part of the town in 2011, and the building now houses a Rotary Shop. By putting up a plaque, the RSC has recognised not only Davy himself, but also his master, John Bingham Borlase. Borlase facilitated Davy's career through his connections with men of science and very generously by releasing Davy early from his indentures so

that he could take up a position in 1798 at the Medical Pneumatic Institution in Bristol. From Bristol, Davy progressed in 1801 to the Royal Institution, London. With peculiar symmetry, in 1813 Davy secured Michael Faraday's appointment as an assistant at the Royal Institution, Faraday having also benefited from the generosity of his master, George Riebau, while an apprentice [2].

Faraday's place of apprenticeship was acknowledged by a Society of Arts plaque erected in 1875-1876 (and still in place). The corresponding plaque for Davy has been long in coming; but in mitigation the delay allowed its award to coincide with the 200th anniversary of Davy's invention of the miner's gauze safety lamp. The plaque has a splendid location, facing down the main shopping street of Penzance, Market Jew Street, frequented not only by local people but also, in the season, by tourists from all over the world. It will probably have more "footfall" than any other Chemical Landmark plaque. (The plaque at Moss Bros, 299 Oxford Street, London [3] may well be *passed* by more people per day, but almost certainly it is *noticed* by fewer.)

Historically [4, 5, 6] the plaque reinforces two lessons:

(i) That Davy was indeed a great chemist. He studied the physiological effects of inhaling various gases, and in particular the effect of nitrous oxide ("laughing gas"). He established and coined the term "electrochemistry", in particular explaining Volta's battery in terms of chemical reactions within the battery, thereby superseding Volta's theory of metal-metal contact potentials. He established that hydrogen chloride and hydrogen iodide contained no oxygen, thereby disproving Lavoisier's "oxygen" theory of acids and demonstrating the elemental nature of chlorine and iodine. He used electricity to isolate sodium, potassium, magnesium, calcium, strontium, barium, and boron (which last Thénard isolated independently), and so demonstrated their elemental nature. He established the reputation of the Royal Institution as the venue for first-class scientific lectures. And – the achievement for which he is best known to the general public – he invented the miner's gauze safety lamp.

(ii) That Davy's Cornish origins affected his outlook on life. Born in Cornwall (in Market Jew Street in fact), in 1800 he wrote to his mother, "Believe me, in the midst of chemical & philosophical experiments & discoveries I very often turn to the beloved place of my nativity and live over again the days of my Infancy & Childhood". Cornwall imbued Davy with the Romantic spirit: Southey compared Davy's poetry with that of Milton, while Coleridge said that Davy could have become the nation's leading poet had he not chosen to exercise his talents in a different direction. Davy did not feel comfortable for long in London: Professor James describes his condition as "alienation". Davy remained a keen fisherman and travelled widely in the British Isles and elsewhere in Europe.

This mention of Davy's travels allows the author to end this piece with the curious fact that the Penzance plaque is the *second* RSC Chemical Landmark plaque referring to Davy, but the first such *in Britain*. The first, at the Académie des Sciences in Paris, celebrates the award of the "Prix de l'Institut" to Davy in 1808 when Britain and France were at war [7, 8]. Davy collected the prize in person in 1813, having travelled to France (with which Britain was still at war) with a special permit authorised by Napoleon.

References

1. Frank is Professor of History of Science at the Royal Institution, London, and also a Professor at University College London. He is a member of the RSC Historical Group Committee.
2. Michael Jewess, "Faraday's 'blue' plaque – commemorating a remarkable master as well as a remarkable servant", *RSC Historical Group Newsletter*, Summer 2013, **64**, 35-41.
3. Website London remembers – aiming to capture all memorials in London, at <http://www.londonremembers.com/memorials/royal-college-of-chemistry>.
4. Frank A.J.L. James, "Humphry Davy at Work: Or why do STS", UCL inaugural lecture, 2 March 2015.
5. Frank A.J.L. James, " 'the place of my nativity': The role of Cornwall in Davy's life", lecture at the ceremony, 17 September 2015.
6. Humphry Davy to Grace Davy, 5 May 1800, RI MS HD/26/A/3.
7. *Wikipedia*, "List of blue plaques erected by the Royal Society of Chemistry", https://en.wikipedia.org/wiki/List_of_blue_plaques_erected_by_the_Royal_Society_of_Chemistry.
8. Embassy of France to the UK, "Celebrating the bicentenary of the 'Prix de l'Institut' awarded to Sir Humphry Davy", Davy", <http://www.ambafrance-uk.org/Celebrating-the-bicentenary-of-the>.

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National Chemical Landmark in honour of Sir Edward Frankland Lancaster Royal Grammar School, 3 November 2015

The plaque is located on the wall adjacent to an entrance to the school. Prior to unveiling it, former RSC President Jim Feast spoke about the Landmark scheme. He referred to the fact that this plaque, and another that he had recently unveiled to Humphry Davy in Penzance, both honoured chemists who had performed work which had resulted in saving human lives – Davy's safety lamp reduced the incidence of colliery explosions, and Frankland's work on improving the quality of domestic water supplies helped to eliminate water borne diseases such as cholera. The party then adjourned to the school library, where John Hudson gave a presentation on Frankland's early life and his main achievements in chemistry.

Frankland's mother (Peggy Frankland) had been a servant to a wealthy family in Preston, where she was seduced by the son of the household. Edward was the consequence of that union. The Preston family provided Frankland's mother with an annuity of £60 per annum on the strict condition that the identity of the father should remain a secret. This was adequate to pay for Frankland's schooling, but not for a university education.

When Frankland was five years old his mother married and the family moved around Lancashire as his new stepfather took a variety of jobs. As a result, Frankland attended a total of eight schools. The family finally settled in Lancaster, where Frankland was a pupil at the grammar school (then known as the Free Grammar School, although it was in fact fee paying). On leaving school at the age of fifteen, Frankland commenced a six-year apprenticeship to a local pharmacist. During this time, he embarked on a rigorous programme of self-education in science. He avidly read books borrowed from the library of the Mechanics Institute, and he attended classes run for apprentices in a makeshift chemistry laboratory set up in a cottage by a family of doctors called Johnson. On completion of his apprenticeship the Johnsons, realising Frankland's huge potential, secured a post for him to work with Lyon Playfair in London. Playfair held a government funded post to analyse and evaluate geological samples (chiefly metallic ores and coal) sent from all corners of Britain. Frankland was on the road to becoming one of the leading chemists of the day.



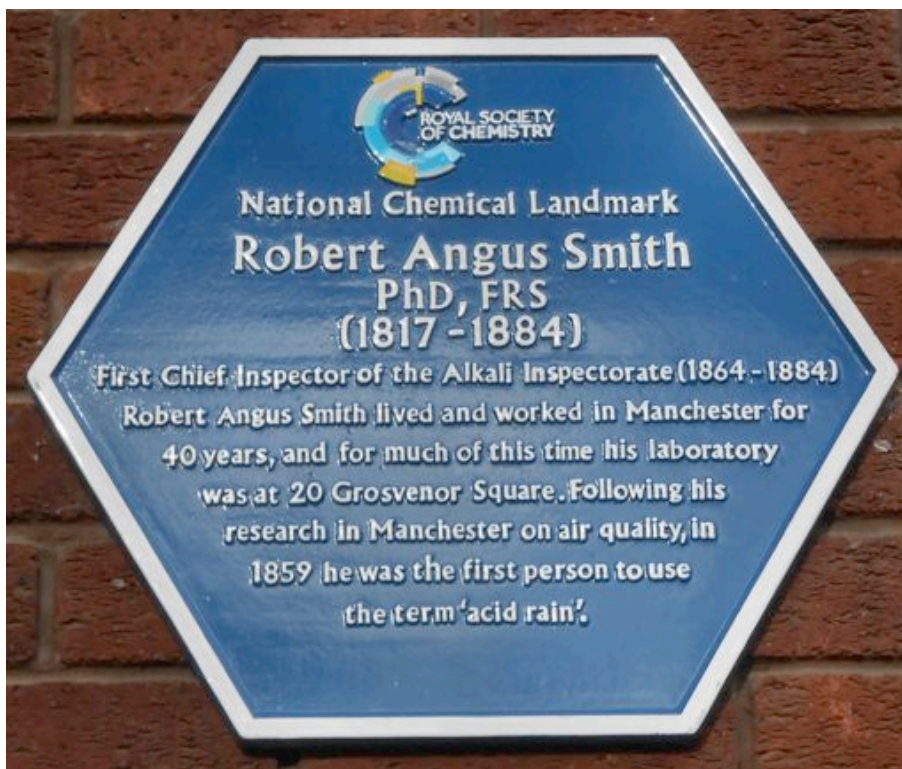
Frankland's contributions to chemistry were numerous and diverse. Among the more important were the synthesis of the first organometallic compounds, thereby opening up a whole new field of chemistry. This work in turn led to the development of the concept of valency. He developed a method for analysing water samples to assess the extent to which they had been previously contaminated by human or animal waste, and served on a number of Royal Commissions concerned with water supply, rivers pollution, and water treatment. He also undertook a considerable amount of private consultancy work, and this resulted in the realisation that chemists were under the disadvantage of not having a professional body of their own. He argued that membership of such a body would indicate an individual had achieved an agreed level of professional competence. His campaigning resulted in the

foundation of the Institute of Chemistry in 1877, with Frankland himself as its first President. He also served as President of the Chemical Society. He was knighted in 1897.

John Hudson

National Chemical Landmark in honour of Robert Angus Smith

The old-style circular Landmark Plaque to Robert Angus Smith, which had an incorrect date on it, has now been replaced by a new-style plaque with the error corrected. It is on the wall of the Manchester Metropolitan University Building facing Grosvenor Square.



MEETING AND CONFERENCE REPORTS

Tenth International Conference on the History of Chemistry

The Tenth International Conference for the History of Chemistry (10ICHC) of the Working Party on the History of Chemistry (EuCheMS) was held on 9-12 September 2015 at the University of Aveiro, Portugal on the theme "Chemical Biography in the 21st Century". The conference was an opportunity to critically examine how the genre has evolved and explore ways in which the biographical approach can be fruitfully employed by historians of chemistry and chemists, especially at a time where manuscript and typed documents are disappearing. It also dealt with problems historians can face with the migration to electronic communication where it is also possible to make sources disappear at a button click.

The conference gathered more than sixty participants from twenty-one countries and three continents. Most participants came from European countries, but there were also participants from USA, Japan, Colombia and Brazil. Even more encouraging was the stronger presence of the younger generation, new faces from countries that have not previously been represented and the presence of colleagues from the Division of the Chemical Education.

The programme combined keynote lectures and thematic sessions with shorter papers. The opening session at the Fábrica Centro Ciência Viva, Science Center of the Aveiro University, was attended by the Rector of the University of Aveiro, Professor Manuel Assunção, who welcomed the participants, and the President of the Portuguese Chemical Society, Professor Maria José Calhorda. The highly regarded Portuguese chemist Jorge Calado (Technical University of Lisbon) then gave a keynote lecture entitled "Ghost Science. Writing the History of 21st Century Science". In her keynote lecture the following day, "Towards a Biography of Carbon at the Intersection Between Nature and Culture", Bernadette Bensaude-Vincent (University of Paris 1 Panthéon-Sorbonne) explored how choosing to write a biography of a scientific object might add to the usual narratives in the history of chemistry and

get deeper into the specific essence of the science. By asking “Who Doesn’t Get a Biography in the History of Chemistry?”, Michael Gordin (Princeton University) analysed the reason why certain important figures such as Paul Walden, or Wilhelm Ostwald, as well as other less known but nevertheless crucial actors, are still missing a decent biography in his keynote lecture on the Friday.

The remaining part of the two and half days was split into parallel sessions that hosted fifty papers, concentrated on a wide range of themes, including Translation, Textbooks, Oral and Digital Sources for Recent History, Controversies and Autobiographies, Myths and Misrepresentations, Prosopography, Dictionaries and Sets of Biography, Historiography, Discipline Building, Biography and History of the Laboratory, Biographies and History of Chemical Engineering. The detailed program and conference book can be found at <http://10ichc-2015.web.ua.pt/>.

The social programme included visits to the beaches of Costa Nova and Barra, a ‘moliceiro’ boat ride through the canals of Aveiro as well as the traditional conference dinner. The high point was the visit to the Museum of Science in Coimbra, the former Laboratório Chimico, the Cabinet of Physics (eighteenth and nineteenth centuries instruments beautifully preserved) and the University chapel and library, as well as the cellars ‘Caves Aliança’ and the esoteric Berardo collection. A one-day excursion was also made to the Douro region

On a personal note British participation (especially by British chemists) was not as strong as it has been (notably at Estoril in 2005 and Leuven in 2007), although some British participants did give papers including Frank James, John Perkins and Hattie Lloyd. It would be good if more Historical Group members could take part in the next ICHC which will be held in Trondheim, Norway, at the end of August 2017. Further details of this conference will be publicised in due course.

Peter Morris

The Wheeler Lecture



John Hudson presents the Wheeler Award to Frank James

Frank James, Professor of the History of Science at University College London and Head of Collections at the Royal Institution was presented with the Wheeler Award at the Royal Institution on 12 October 2015. His lecture, entitled “*the first example of an extensive scheme of pure scientific medical investigation*”: *Thomas Beddoes and the Medical Pneumatic Institution in Bristol*, will be published as an RSCHG Occasional Paper in due course.

Bragg Meeting, Royal Society of Chemistry, Burlington House, London, 12 October 2015

The Early Career of Kathleen Lonsdale in X-ray Crystallography Working with Sir William Henry Bragg

Jennifer Wilson, University College London

The presentation focussed on the early career of Kathleen Lonsdale in which she progressed from student researcher to becoming a prominent researcher in the field of crystallography. A key influence was the support, advice and guidance Lonsdale received from Sir William Henry Bragg evidence of which was demonstrated throughout the presentation using extracts from the original correspondence between them and from Lonsdale's own writings.

Born Kathleen Yardley in Ireland to a family in very poor circumstances, she moved to England following her parents' separation. Her academic ability enabled her to obtain a place at Bedford College where she graduated with a first class honours. As a result, Bragg, who had been her examiner, offered Yardley a position in his team at University College London and she started her career in X-ray crystallography. A year later Yardley moved with Bragg to the Davy Faraday Research Laboratory at the Royal Institution and became skilled in the use of the X-ray spectrometer, an instrument devised by Bragg. After four years she left the Royal Institution and moved to the University of Leeds following her marriage to Thomas Lonsdale.

At Leeds Lonsdale established her own laboratory and achieved a notable success in confirming the structure of benzene. Three years later now a mother and expecting her second child the family moved back to London. Initially working at home on tables of mathematical formulae needed for crystal structure determination Lonsdale moved back to the Davy Faraday, aided by funding obtained by Bragg.

A year later Lonsdale left to have her third child but then returned to continue her career working with Bragg and developing new areas of research within the rapidly expanding field of X-ray crystallography. Three years after Bragg's death Lonsdale became one of the first two women to be elected a Fellow of the Royal Society, an honour which Bragg would have been proud of.

The Braggs' Role in X-ray Crystallography

Mike Glazer, Oxford University

In 1912 the 22-year-old physics graduate William Lawrence Bragg (WLB) realized how to interpret photographs, taken in Germany by Laue, Friedrich and Knipping, showing diffraction of X-rays by a crystal. He demonstrated that it was possible to use this information to determine the atomic structures of crystals, thus heralding a completely new scientific discipline – X-ray Crystallography. He then worked with his father William Henry Bragg (WHB) to study many crystal structures up to the beginning of World War I, when research work had to stop. During the war, in 1915, father and son were awarded the Nobel Prize, making them the only father and son team to share a Nobel Prize with WLB being the youngest prize-winner in science. After the war both WHB and WLB set up their own research groups, WLB going to Manchester while WHB went to UCL and to the Royal Institution. They both continued to develop the subject and produce many new and important results. They both encouraged women into scientific research and several of them later became very famous, for instance Dorothy Hodgkin (Nobel Prize in 1964) and Dame Kathleen Lonsdale. Their pioneering work has meant that we now can study the atomic structures of most solid materials, including metals, organic and inorganic compounds, proteins and viruses. The determination of the structure of DNA in WLB's laboratory in Cambridge by Crick and Watson is probably the most well-known, and this work has led to the modern revolution in the science of genetics. The Braggs' legacy is outstanding and the science of crystallography continues to develop, especially with the building of new radiation sources, such as synchrotrons and free electron lasers.

Bragg and the Beeb: Lawrence Bragg, the Royal Institution and Televising Science, 1938-1966

Rupert Cole, University College London

This paper examined Lawrence Bragg's efforts at establishing television at the Royal Institution (RI) during his tenure as Director of the Davy-Faraday Research Laboratory (DFRL) and Resident Fullerian Professor of Chemistry between 1954 and 1966. Both William Henry Bragg and William Lawrence Bragg, father and son, became well-known broadcasters of science – the former made his mark in radio and the latter in television. They were both also influential members of the BBC's General Advisory Council.

Before Bragg took over the reins at the RI in 1953, the BBC had made a number of television broadcasts from the RI, including occasional Christmas Lectures. Following the controversy of the chemist Edward Andrade's enforced resignation in 1953 as the RI's Director of the DFRL and Resident Professor, the BBC proved reluctant to work with the RI. Over the following years Bragg made numerous attempts to bring television and the BBC back to the RI. His efforts finally paid off, after forming an important and long-lasting acquaintance with BBC science producer Philip Daly, Bragg developed and presented two series of short science lectures for television, entitled *The Nature of Things*, broadcast in 1959 and 1961.

The Nature of Things exemplified Bragg's ideal method of communicating the 'science of the everyday' through demonstrations of familiar objects. Further BBC-RI collaborations followed under Bragg's leadership, including the

televising of a C.P. Snow discourse in 1963 and the first complete series of Christmas Lectures in 1966 – the latter is a television tradition that still continues today. Despite political obstacles such as the aftermath of the Andrade affair and the so-called ‘Victorian’ attitudes of the RI’s Managers, Bragg successfully instituted television at the RI, paving the way for his successor George Porter to further develop the BBC-RI relationship.

Using Synchrotrons, Neutrons and Computers to Unravel the Atomic Architecture of Matter

Richard Catlow, Department of Chemistry, University College London; School of Chemistry, Cardiff University

Structural science, the field founded by the Braggs, is at the heart of contemporary chemistry, materials science, molecular biology and condensed matter physics. Indeed, the stunning success of crystallography over the last 100 years allows us to determine the intricate atomic arrangements in systems as complex as viruses and real working catalysts. Moreover, in the last few decades, new horizons in the field have been opened up by new radiation sources and by the power of modern computation.

Synchrotron Radiation – originally an offshoot of accelerator technology – generates X-rays that are many orders of magnitude more brilliant than those available from laboratory sources, facilitating the determination of structures of exceptional complexity including those studied by molecular biologists and materials chemists. Moreover, the intensity of the X-rays allows data to be collected so quickly that structural changes can be followed, for example during a chemical reaction. Neutron Beams produced from fission reactors or again using accelerator technology allow us to probe the positions of light atoms, especially hydrogen, which are almost invisible to X-rays but whose precise location is often key to understanding the functioning of a molecule or material. Neutron crystallography has also revealed the intricate and beautiful magnetic structures of materials. Computational techniques of course play an indispensable role in analysing data in contemporary crystallography; but computer modelling now allows us increasingly to predict the structures of crystals from a knowledge of their composition – an exciting possibility which assists and complements experimental studies. Structural scientists will continue to build on the marvellous legacy of the Braggs by exploiting these and other technologies to probe the atomic architectures of molecules and materials and to understand how structure controls their function.

FORTHCOMING MEETINGS

Royal Society of Chemistry Historical Group Meetings

H.G.J. Moseley (1887-1915): A Lost Nobel Laureate

19 October 2016, Royal Society of Chemistry, Burlington House, Piccadilly, London

Moseley, although originally intending to read chemistry at Oxford, became a physicist whose work revolutionised chemistry. He determined atomic numbers of elements, the charge on the nucleus, identical with the number of electrons in the neutral atom. Atomic number correlated universally with the chemically-necessary positions of elements in the periodic table, unlike atomic weight (which would interchange the pairs K and Ar, Co and Ni, Te and I, and Th and Pa). It also confirmed that elements remained to be discovered: those with atomic numbers 43 (Tc), 61 (Pm), 72 (Hf), and 75 (Re). Moseley laid the foundation for X-ray fluorescence spectroscopy, now a routine analytical tool. His death in the ill-fated Dardanelles campaign against the Ottoman Empire in 1915 invalidated Arrhenius’ nomination of him for the 1916 Nobel Prize for Physics. Full details on the meeting will appear in the summer 2016 *RSCHG Newsletter*.

British Society for the History of Pharmacy Meetings

Pharmacy History: Sources and Resources

Monday 18 April 2016, from 2pm, Wellcome Trust, London

Join the British Society for the History of Pharmacy for an afternoon showcasing the breadth of pharmacy history. Speakers Caroline Petit (Warwick University), Damian Nicolaou (Wellcome Library), Anna Simmons (UCL) and Selina Hurley (Science Museum) will explore Galen and his impact, the challenges of bringing *The Chemist and Druggist* journal to a twenty-first century online audience, the wealth of source material available for investigating pharmaceutical industry, and the plans for presenting pharmacy history in the Science Museum’s new medicine galleries.

Full booking details will be available soon. Register your interest now with BSHP Programme Secretary, Briony Hudson, events@bshp.org or watch out for publicity!

SCI London Regional Group

The SCI London Regional Group Spring 2016 lecture series is now underway,

<http://www.soci.org/membership-and-networks/regional-groups/london-group/group-events>

Of particular interest to RSCHG members is the lecture to be given by Professor Frank James entitled '*Science, gentlemen, is of infinitely more importance to a state than may at first sight appear possible*': *The Life and Work of Humphry Davy (1778-1829)* on 15 March 2016, 17:45 for 18:15. Organised by the SCI's London Group in partnership with UCL's Chemical and Physical Society, it will take place at the Department of Chemistry, University College London.

The talk will trace Davy's career from provincial obscurity as an apothecary's apprentice in Penzance, through to Superintendent of the Medical Pneumatic Institution in Bristol, to metropolitan fame as Professor of Chemistry at the Royal Institution and later as President of the Royal Society of London. In the course of this trajectory, Davy, amongst much else, wrote poetry, discovered the physiological effects of nitrous oxide (laughing gas), systematically researched on electro-chemistry (a term he coined), discovering and naming sodium and potassium in the process, invented the miners' gauze safety lamp, developed a chemical method of unrolling the papyri excavated at Herculaneum and electro-chemically disabled the Royal Navy. As he appreciated, but tried to play down except when it suited him, much of

his work stemmed from immediate practical demands including those of the state which will be a major theme of this illustrated talk. For more information, see:

<https://www.soci.org/Events/Display-Event?EventCode=SLON150316>

Institute of Physics History Group Meetings

A History of Units from 1791 to 2018

Thursday 17 March 2016

National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW

In anticipation of the redefinition of the kilogram in terms of Planck's Constant in 2018, this joint meeting will look back at the beginnings of the metric system, and at the evolution of metrology in mass, time, temperature and resistance measurement since that time. Advance registration necessary. For further information, visit:

<https://www.iopconferences.org/iop/frontend/reg/thome.csp?pageID=413856&eventID=832&eventID=832>

A Poetic View of William Rowan Hamilton

Tuesday 14 June 2016, 17:15 – 18:45

Institute of Physics, 76 Portland Place, London W1B 1NT

William Rowan Hamilton, the great nineteenth century mathematical physicist, tried his hand at poetry, so it is entirely appropriate that he should be celebrated in that form. Iggy McGovern, physicist and poet, has written a sonnet sequence which reflects views of Hamilton by his contemporaries. McGovern's work is characterised by a wry sense of humour. Participants will perform the readings, some of which will have a scientific perspective, from the likes of Airy and Tait, but others will feature notable figures from Irish society. Advance registration necessary. For further information, visit:

<https://www.iopconferences.org/iop/frontend/reg/thome.csp?pageID=418544&eventID=840&eventID=840>

FORTHCOMING CONFERENCES

Eighth Joint Meeting of the BSHS, CSHPS, and HSS, 22-25 June 2016, Edmonton, Alberta, Canada

The eighth joint meeting of the British Society for the History of Science, the Canadian Society for the History and Philosophy of

Science, and the History of Science Society will take place in Edmonton, Alberta, Canada. Previous successful meetings were in Philadelphia (2012), Oxford (2008), Halifax, Nova Scotia (2004), St Louis (2000), Edinburgh (1996), Toronto (1992), and Manchester (1988).

The theme of the meeting will be "Transitions". Although presenters are not confined to this theme, the Programme Committee is seeking papers or sessions that reflect this theme and encourages participants to consider the broader scientific, scholarly and social implications associated with moments of scientific transition. Transitions might include such ideas as moving from one scientific meme to another, one locality to another or generational change.

The conference will take place at the University of Alberta. Founded in 1905, the University of Alberta is located in Edmonton, Canada's most northern major city. Edmonton is known as the "Gateway to the North" and is the capital

of the province. It is a major economic and cultural hub, situated on the banks of the North Saskatchewan River. The conference will include education and outreach activities, a reception at the Art Gallery of Alberta and a Conference Dinner. Delegates can explore the vibrant arts scene, and there are many festivals in June, including the Edmonton International Jazz Festival. Accommodation will be available on campus and near campus.

For further details, visit: www.uab.ca/3societies

Registration for the Three Societies Meeting is now open, with early bird rates available until 15 April 2016. Participants can access the special conference rates for the hotels both before and after the conference (from June 19-27), in case they want to do a bit more exploring. Information will also be provided to make arrangements for other travel in the area such as: to the Rocky Mountains and Jasper, Banff, Lake Louise or the Columbia Icefields; to the Alberta Badlands and Royal Tyrrell Dinosaur Museum; or to the Oil Sands in Fort McMurray.

To register visit: <https://uofa.ualberta.ca/arts/research/3-societies-meeting>

Twenty-Fifth International Congress of the History of Science and Technology

23-29 July 2017, Rio de Janeiro, Brazil

The 25th International Congress of History of Science, and Technology (ICHST), will be held in the city of Rio de Janeiro, Brazil, from 23 to

29 July 2017, with the general theme “Science, Technology and Medicine between the Global and the Local”. This is the first time that this event been held in South America and the Southern Hemisphere.

Questions of place are gaining increasing importance in the work of historians of science, technology and medicine, to such an extent that some scholars suggest this corresponds to a veritable “spatial turn”. It is unavoidable that researchers take sides on issues such as the situatedness of knowledge and practices, the problems pertaining to their movements across spaces and cultures (and not only along time) and, above all, the proper choice of scales of analysis – all the way between the global and the local, which is the core of the 25th ICHST’s theme. At the same time, this theme relates to the very nature of the Congress as the largest international gathering of historians of science, technology and medicine, inviting one to think about what we may say to and learn from each other, considering our own multifarious places and standpoints.

The 25th ICHST will be held in the Praia Vermelha campus of the Federal University of Rio de Janeiro (UFRJ), served by various forms of public transport and close to hotels, beaches, and numerous artistic and cultural attractions. Rio de Janeiro is also one of the principal locations of teaching and research concerned with the History of Science, Technology and Medicine in the country; a field of study which has developed significantly in Brazil in the last thirty years, and of which the Brazilian Society for the History of Science (Sociedade Brasileira de História da Ciência - SBHC) is the principal representative. SBHC and the Division of History of Science and Technology of the International Union of History and Philosophy of Science and Technology (IUHPST/DHST) have joined forces for the organization of the 25th ICHST and hope to receive researchers from various continents for this event.

For further details, visit: <http://www.ichst2017.sbhc.org.br/>

Eleventh International Conference on the History of Chemistry

The next ICHC will be held in Trondheim, Norway on 29 August 2017 to 1 September 2017, with an excursion on 2 September 2017. More details will appear in subsequent RSCHG newsletters.