



Historical Group

NEWSLETTER and SUMMARY OF PAPERS

No. 71 Winter 2017

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<http://www.rsc.org/membership/networking/interestgroups/historical/index.asp>

RSC Historical Group Newsletter No. 71 Winter 2017

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From the Editor

Welcome to the winter 2017 RSC Historical Group Newsletter. The next meeting organised by the group celebrates the centenary of Robert Burns Woodward's birth and will take place on Wednesday 10 May 2017 at the Royal Society of Chemistry, Burlington House. At this meeting, Jeff Seeman will give the Wheeler Lecture entitled *Woodward's Unpublished Letters*. Full details on how to register for the meeting can be found in the flyer enclosed with the hard copy version of the newsletter and also in the online version. To coincide with this anniversary, Peter J.T. Morris' Wheeler Lecture *Robert Burns Woodward in his Own Words* will be published as the Historical Group's ninth occasional paper in spring 2017. RSCHG Members may also be interested in attending SHAC's spring meeting on Saturday 20 May at the Royal Institution: *New and Old Themes in the History of Chemistry*. This meeting will honour Bill Brock, a long-standing member of both SHAC and the RSCHG, and also mark eighty years of the journal *Ambix* - full details can be found in the newsletter.

This issue contains a wide variety of news items, articles, book reviews and reports. As a precursor to the RSCHG meeting to be held next October, Alan Dronsfield writes about chemistry and the alleviation of pain using local anaesthesia. Following on from Alwyn Davies' article in the summer 2016 Newsletter about William Ramsay's pli cacheté, Michael Jewess highlights a sealed packet of Michael Faraday's and the special commercial value given to sealed packets in French patent law. In the final article, Chris Cooksey looks at the "most popular yellow colorant in the world" - turmeric.

There are three book reviews in this issue. The first is of Brian Iddon's book, *Science and Politics: An Unlikely Mixture*. For anyone wanting to visit history of chemistry sites whilst travelling around Britain or on holiday, *Science*

History: A Traveler's Guide, edited by Mary Virginia Orna, is recommended. A review is also included of Raymond G. Stokes and Ralf Banken's book *Building on Air: The International Gases Industry, 1886-2006*. Russell Egdell writes about the RSCHG meeting held in October 2016 on "H.G.J. Moseley (1887-1915), A Lost Nobel Laureate?" The speech given at this meeting by Counsellor Mr Cem Işık of the Embassy of the Republic of Turkey is also reproduced. Reports also appear on the Dalton Anniversary Celebrations held in Manchester, where National Chemical Landmark Plaques were unveiled; the centenary of the opening of the Dyson Perrins Organic Chemistry Laboratory; and a Blue Plaque for the nineteenth-century analytical chemist, Dr Alphonse Normandy.

Finally, I would like to thank everyone who has sent material for this newsletter. I would also like to give particular thanks to the newsletter production team of Bill Griffith and Gerry Moss and to also John Nicholson, who liaises with the RSC regarding its online publication. 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 2017 issue will be Friday 9 June 2017. 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

Welcome to the latest edition of our Newsletter. We publish the Newsletter in two formats – online and hard copy. The online version is accessed via the Historical Group's page on the RSC website. You should get an automatic email from the RSC when the latest version is available, but for the record the Newsletter appears twice each year – usually in January and July. In the online version, we have greater flexibility in presenting some of the material – for example, it is possible to reproduce some of the illustrations in colour. We post the hard copy version to those members who request it. Printing and posting the hard copy version is expensive, and if you are receiving the Newsletter in hard copy and would be happy to read it online, please send an email to our Membership Secretary, Bill Griffith (w.griffith@ic.ac.uk). Similarly, email Bill if you don't currently receive the hard copy and would like to do so.

A number of us give presentations on historical topics to various groups and societies. The list of speakers and topics, kindly maintained by Chris Cooksey, is available on the Group's page on the RSC website. We believe that giving these presentations promotes interest in the history of chemistry. Also, when we talk to groups outside of the chemical community, we hope that we stimulate interest in both the RSC and in chemistry in general. For my own part, I have spoken to U3A groups, a local history society, friends of a local museum, as well as a number of RSC Local Sections and student chemical societies. However, we don't keep a record of the total number of presentations given by members of the Group each year. At a recent meeting between Committee Officers and RSC staff when our level of funding was being discussed, we were unable to quantify our activity in this area. I am therefore asking all members involved in such activity to send an email to our Secretary, John Nicholson (jwnicholson01@gmail.com) towards the end of each year detailing the number of presentations they have given. John will then include the total in his annual report to the RSC. Any member who would like to add a presentation to the list should send details to Chris (chriscooksey8@gmail.com).

Finally, we are always glad to hear from volunteers who might wish to consider standing for the Committee. Anyone interested should contact either John Nicholson or myself.

John Hudson
RSCHG Chairman

ROYAL SOCIETY OF CHEMISTRY HISTORICAL GROUP MEETINGS

The Centenary of Robert Burns Woodward (1917-1979)

Wednesday 10 May 2017, Burlington House, Piccadilly, London

Programme

- 13.00 Registration and tea or coffee
13.30 Welcome (Dr John Hudson, Chairman, Historical Group)

First Session – Chair: Henry Rzepa (Imperial College)

- 13.40 Peter Morris (Science Museum)
“Was Robert Burns Woodward a Great Chemist?”
14.10 Pierre Laszlo (Cornell University)
“The Simmons-Woodward Interaction”
14.40 Mark Whiting (University of Bristol)
“Working with Woodward, 1951-2”
15.00 Stanley Roberts (Manchester University)
“The Aroma of Yardley Aftershave”
15.20 Tea interval

Second Session – Chair: Peter Morris (Science Museum)

- 15.40 Jeffrey Seeman (University of Richmond, Virginia)
Wheeler Lecture: “Woodward’s Unpublished Letters”
16.40 Jeffrey Seeman (University of Richmond, Virginia)
“Woodward, Corey and the Rashomon Effect”
17.00 Short Playlet by Jeffrey Seeman and Anthony Barrett FRS FMedSci (Imperial College)
17.20 Concluding remarks by Peter Morris: *Remembering Woodward*
17.30 Close of meeting

REGISTRATION FORM

There is no charge for this meeting, but prior registration is essential. Please use the form below and send it to Professor John Nicholson, 52 Buckingham Road, Hampton, Middlesex, TW12 3JG, or email 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 10 May 2017 at Burlington House, Piccadilly, London on The Centenary of Robert Burns Woodward (1917-1979).

Name.....
...

Address.....
...

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

Additional Historical Group Meeting for 2017

Plans are being developed for a third historical symposium this year in addition to the R.B. Woodward meeting on May 10 and the meeting *Chemistry and Anaesthesia - Some Historical Perspectives* scheduled for October 18. The additional meeting will be entitled *Rutherford’s Chemists*. Like the recent meeting at Burlington House on H.G. Moseley, it will be a joint meeting between ourselves and the History Group of the Institute of Physics. Details are not yet finalised, but it will probably be a two-day meeting in Glasgow, with the likely dates 15-16 July 2017. All members will be informed of the final arrangements by email, and details will also be published on the Historical Group’s page on the RSC website. Speakers are likely to include John Heilbron on the Solvay Conferences, Maria Rentetzi on Stefan Meyer and the Vienna Radium Institute, Linda Richards on Frederick Soddy and Ted Davies on Bertram Boltwood.

OBITUARY

Though not a member of our Group, David Zuck who died aged ninety-six in November 2016, attended a number of our recent symposia. Indeed, he contributed to several where they reflected his specialism, the history of anaesthesia. He recognised the continuing connection between anaesthesia and chemistry and until recently had every intention of attending next October's meeting on this topic. We extend our sympathy to his children, Michael and Linda, and to his travelling companion of recent years, Mala Tribich.

Alan Dronsfield

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.

Hannah Gay and William P. Griffith, *The Chemistry Department at Imperial College London: A History, 1845-2000* (Abingdon: World Scientific Publishing, January 2017).

The new book by Bill Griffith, the RSCHG's Membership Secretary, and Hannah Gay is accurately described by its title. Imperial College was so named in 1907 but began life in 1845 as the Royal College of Chemistry, subsequently (1881-1907) called the Royal College of Science. The book is roughly chronological in layout, and concentrates on research, teaching, departmental governance and social life. It covers the many famous figures on its staff from 1845 to (almost) the present day. It places both people and events in the wider historical context of chemistry, politics, culture and the economy, and is richly anecdotal. It will be reviewed in our Summer 2017 *Newsletter* by Anna Simmons.

Chris Cooksey, "Quirks of dye nomenclature. 6. Malachite green", *Biotechnic & Histochemistry*, 2016, **91**:6, 438-444.

<http://dx.doi.org/10.1080/10520295.2016.1209787>

Malachite green was discovered independently by two researchers in Germany in the nineteenth century and found immediate employment as a dye and a pigment. Subsequently, other uses, such as staining biological specimens, emerged. A much later application was the control of fungal and protozoan infections in fish, for which the dye remains popular, although illegal in many countries owing to a variety of toxicity problems. In solution, malachite green can exist as five different species depending on the pH. The location of the positive charge of the coloured cation on a carbon atom or a nitrogen atom is still debated. The original names of this dye, and their origins, are briefly surveyed.

Interested people can download copies at

<http://www.tandfonline.com/eprint/ccqCj5asm9zMyTJNbAf5/full>

but only fifty copies are available, so if that does not work, please contact the author: (chriscooksey8@gmail.com).

Chris Cooksey, "Pliny's First Century AD Recipe for a Purple Dye-Vat – Decoded", J. Ortiz, C. Alfaro, L. Turell and M.^a J. Martínez (eds.), *Purpureae Vestes. V. Textiles, Basketry and Dyes in the Ancient Mediterranean World* (Universitat de València, 2016), pp. 217-220.

The first century AD recipe for the shellfish purple dye vat, described by Pliny the Elder, is examined in the light of modern chemical knowledge and the crucial parameters required for a successful result are revealed. Paper given at Fifth International Symposium on Textiles and Dyes in the Ancient Mediterranean World, Santa Maria de Montserrat Abbey, Montserrat, 19-22 March 2014.

RSC Historical Group Occasional Papers No. 8

Frank James' Wheeler Lecture '*the first example ... of an extensive scheme of pure scientific medical investigation*': *Thomas Beddoes and the Medical Pneumatic Institution in Bristol, 1794 to 1799* was published online in December 2016. RSCHG members should have received an email from the RSC informing them of its publication. Interested members can view the paper via the RSCHG website: www.rsc.org/historical or www.chem.qmul.ac.uk/rschg.

NEWS AND UPDATES

Society for the History of Alchemy and Chemistry

The following issues of SHAC's journal *Ambix* have been published since the last issue of the *RSCHG Newsletter*.

Ambix, volume **63**, issue 2, May 2016, *From the Library to the Laboratory and Back Again: Experiment as a Tool for the History of Science*, contains the following articles:

Hjalmar Fors, Lawrence M. Principe and H. Otto Sibum, "From the Library to the Laboratory and Back Again: Experiment as a Tool for Historians of Science".

Sébastien Moureau and Nicolas Thomas, "Understanding Texts with the Help of Experimentation: The Example of Cupellation in Arabic Scientific Literature".

Lawrence M. Principe, Chymicall Exotica in the Seventeenth Century, or, How to Make the Bologna Stone".

Haileigh Robertson, "Re-working Seventeenth-Century Saltpetre".

Lawrence Principe's article was the focus of Philip Ball's monthly column "Crucible" in the December 2016 issue of *Chemistry World*: Philip Ball, "A lode of Bologna", *Chemistry World*, vol. 13, issue 12, p. 44. Ball highlighted that "Principe's studies, described in *Ambix*, make for one of the most enjoyable papers I have read for a long time".

Abstract of Principe's paper:

The Bologna Stone, a mineral that became luminescent after chymical treatment, represents one of several "chymical exotica" eagerly sought by natural philosophers of the seventeenth century. Curiously, by mid-century the way to make it luminescent was considered a "lost secret" even though several methods had been repeatedly published. This disconnect between published recipes and experimental failures was explained in part by the investigations of Wilhelm Homberg (1653–1715), later the leading chymist of the Académie Royale des Sciences, and in part by the present author's modern reproduction of Homberg's process. This paper describes both endeavours, and explores the often-overlooked difficulties presented by even "trivial" materials involved in experimentation, and how practical reproduction of historical processes (including visits to important locales) can provide a deeper and more vivid understanding of texts as part of our project to better understand the past. It concludes by reflecting on the importance of maintaining a balance between the material and the intellectual when writing the history of chemistry.

From *Ambix*, vol. **63**, issue 2, p. 118.

Ambix, volume **63**, issue 3, August 2016 contains the following articles:

Maria Chiara Succurro, "The Liber Compostelle Attributed to Friar Bonaventure of Iseo: The Textual Tradition of a Thirteenth-Century Alchemical Encyclopedia".

Rafal T. Prinke, "New Light on the Alchemical Writings of Michael Sendivogus (1566-1636)".

Isabella Whitworth and Zvi C. Koren, "Orchill and Tyrian Purple: Two Centuries of Bedfords from Leeds".

Essay Review: Jennifer Rampling, "The Englishing of Medieval Alchemy".

For more information on SHAC and *Ambix* visit www.ambix.org

Science and Technology Archives Group

The Science and Technology Archives Group has recently been created to celebrate and promote scientific archives. The group wants to engage with everyone who has an interest in the creation, collection, preservation and use of archives relating to science, technology, engineering and related disciplines.

Aims

- to create a network for all those who have an interest in archives relating to science, technology, engineering and related disciplines.
- to share knowledge of those archives more widely.
- to raise awareness of the value of scientific and related archives in all media and formats for research, education and public enjoyment.

The introductory webpage (currently hosted by The National Archives) is at:

<http://nationalarchives.gov.uk/archives-sector/projects-and-programmes/science-technology-archives-group/>.

The webpage includes a list of steering committee members and a link to the options paper produced by The National Archives that began the discussions from which the group arose. As the group develops, it will maintain a website as a central portal for information and advice relating to the collection, care and use of archives of science, engineering and related disciplines.

These are very early days. As well as an active website and email list (see below), the group is aiming to hold a range of workshops and conferences and produce guidance material. It will look to work with bodies such as the Health Archives and Records Group, the Scientific Archivists Group and the British Society for the History of Science, as well as institutions holding significant science and engineering archives collections.

If you have responsibility for, an interest in or make use of archives of science, engineering and related disciplines this will be a group for you, so please do subscribe to the STAG email list at STAG@JISCMail.AC.UK. Or visit www.jiscmail.ac.uk and search for STAG.

New President for the Chemical Heritage Foundation

Robert Anderson, former Director of the British Museum has been selected as the President and CEO of the Chemical Heritage Foundation. He has been interim President since 28 July 2016, stepping into the role from his position as Vice Chair of CHF's Board of Directors. "The process of searching for a new president and CEO took us far afield but in the end we found the perfect person close to home: Robert Anderson, former Director of the British Museum, long-time CHF board member, and internationally recognized historian of science, has agreed to share his knowledge and expertise to lead CHF into the future. We are so fortunate to have Robert step into this role", said Laurie Landeau, Chair of CHF's Board of Directors. Anderson assumes his new role effective immediately.

Anderson has wide-ranging interests in the history of chemistry, including the history of scientific instrumentation, the work of Joseph Black and Joseph Priestley, the history of museums, and the involvement of the working class in material culture. He has been Director of the British Museum, London, where he presided over the creation of the £110 million Great Court; Keeper of Chemistry at the Science Museum, London; and Director of the National Museums of Scotland in Edinburgh. He has been Chairman of the Society for the History of Alchemy and Chemistry since 2008 and was honoured with the Wheeler Award by the Royal Society of Chemistry Historical Group in 2004.

Johnson Matthey Bicentenary

2017 is the 200th year of Johnson Matthey

See https://twitter.com/Johnson_Matthey/status/819468776890572804 for updates celebrating 200 years of inspiring science and what's to come in the next 200!

Johnson, Matthey and the Chemical Society

The founders of Johnson Matthey – Percival Johnson and George Matthey – played important roles in the creation and running of the Chemical Society, which was founded in 1841. This tradition continues today with the Royal Society of Chemistry and Johnson Matthey Plc. Bill Griffith's article on this subject from *Platinum Metals Rev.*, 2013, **57**, (2), 110 can be accessed at:

<http://www.technology.matthey.com/article/57/2/110-116/>

Further information on the history of Johnson Matthey and the history of platinum and its allied metals can be found at:

http://www.matthey.com/about_us/history and <http://www.matthey.com/innovation/history>

SHORT ESSAYS

From Cocaine to Novocaine – Chemistry and the Alleviation of Pain using Local Anaesthesia

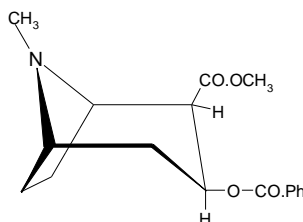
Until the mid-nineteenth century surgical intervention would be attended with pain. The early literature has accounts of attempts to minimise this and closest to what we now define as local anaesthesia were nerve compression using clamps and freezing the tissues with an ice-salt mixture. The former never really caught on, possibly as it was dubiously effective, and the latter was suitable for minor operations such as lancing an abscess. However, the patient would then experience pain as the frozen tissues thawed out. For most, surgery was a matter of being strapped or held down and given a leather pad to bite on. William Morton's use of ether vapour to induce general anaesthesia (1846) meant that patients could be sent to sleep during the operation: no longer did they have to fear the surgeon's knife [1].

But there were disadvantages. Ether anaesthesia killed about 1 in 12,000 individuals. Chloroform, introduced in 1847, though preferred by patients on account of its less unpleasant smell, was even more dangerous, accounting for the deaths of 1 in 3,000 patients undergoing surgery. Severe retching often accompanied recovery but, though distressing to the patient at the time, it was only short-lived. However it was a serious problem for those undergoing eye surgery. High doses of anaesthetic agents were necessary to prevent the eyeball moving when touched, and with them, the greater likelihood of retching. This would induce a high pressure within the eyeball, sufficient to break the

fine sutures the surgeon had used to secure his work, with disastrous consequences. In the 1880s attempts were being made to find eye drops that might enable painless eye surgery with the patient wide awake. Nothing worked and moreover, most of these ineffective agents irritated the eye for hours afterwards.

Enter cocaine

Natives of South America had long chewed the leaves of the shrub *Erythroxylum coca* on account of the pleasurable “wakeful” sensations it induced. With the advent of refrigerated ships in the mid-nineteenth century, the leaves could be exported to Europe both for commercial exploitation and chemical investigation. Angelo Mariani (1838-1914) was a chemist who succeeded in the former. He steeped the coca leaves in cheap Bordeaux wine. The resulting “tonic” wine, marketed from 1863, had a cocaine content of 6.0-7.2 mg per fluid ounce (28 cm³) and was enthusiastically endorsed by the celebrities of the period. An alcohol-free effervescent coca drink was also marketed from 1886: *Coca-Cola* (today’s product is cocaine-free, of course). The chemists got to work on the leaves, too. In 1855 Friedrich Gaedcke isolated cocaine in a reasonably pure state. Combustion analysis carried out by Wilhelm Lossen in 1863 showed that its empirical formula was C₁₇H₂₁NO₄ and in 1894 Richard Willstätter proposed today’s structural formula (I):



(I)

The availability of the pure alkaloid in the second half of the nineteenth century led to its investigation by medical practitioners who seemingly uncritically endorsed its use to treat all sorts of disconnected ailments, among them toothache, paroxysmal sneezing, hay fever, whooping cough and deafness resulting from ear infections. The fact that its consumption gave patients a perceptible “lift” led to its use in the remediation of the lassitude associated with morphine addiction and “neurasthenia”, a condition that today most likely would be diagnosed as depression. That patients might become addicted to the drug was denied, overlooked or ignored. Prominent among the “deniers” was Sigmund Freud, the father of psychoanalysis, whose enthusiasm for the drug was catalysed by a suggestion in 1884 by a German physician named Theodor Aschenbrandt, reporting that the drug suppressed the appetite and increased mental powers and endurance of Bavarian soldiers. Freud enthused about:

exhilaration and lasting euphoria, which in no way differs from the normal euphoria of the healthy person...You perceive an increase of self-control and possess more vitality and capacity for work...In other words, you are simply normal, and it is soon hard to believe you are under the influence of any drug....Long intensive physical work is performed without any fatigue...This result is enjoyed without any of the unpleasant after-effects that follow exhilaration brought about by alcohol...Absolutely no craving for the further use of cocaine appears after the first, or even after repeated taking of the drug [2].



Karl Koller

Image courtesy of: [https://en.wikipedia.org/wiki/Karl_Koller_\(ophthalmologist\)](https://en.wikipedia.org/wiki/Karl_Koller_(ophthalmologist))

He was intrigued by the report that a patient, having been prescribed a 5% solution of cocaine as an oral medicine as a remedy for intestinal pain, experienced a numbness of the lips and tongue. He passed this observation on to an ophthalmologist colleague who in turn passed it on to Carl (Karl) Koller, another ophthalmic surgeon who at the

time was struggling against the effects that chloroform and ether anaesthesia were having on his patients. Koller had been attempting, unsuccessfully, to anaesthetise the eye prior to surgery using solutions of morphine sulphate or chloral hydrate. Having confirmed the observation that cocaine made his lips numb, Koller decided to try its effects on the eye. He cautiously applied a solution of cocaine hydrochloride to a frog's eye and found it became insensitive to touch. He moved on to rabbits, then dogs, and finally himself:

...We (Koller and an anonymous assistant) trickled the solution into each others' lifted eye-lids. Then (we) placed a mirror before us, took pins and with the heads, tried to touch the cornea. Almost simultaneously we were able to state jubilantly 'I can't feel a thing'. [3]

Koller presented his results to an ophthalmological conference in September 1884, opening a new era in eye surgery.

Events then happened quickly. It was found within days that topical applications of cocaine solutions could effectively anaesthetise most mucous membranes. On 15 November 1884, Dr N.J. Hepburn injected a 2% solution under the skin of a patient's arm and achieved local anaesthesia. This was followed up a week later by a report from Dr F.M. Wilson who removed a fatty tumour from the forehead of a patient, having first anaesthetised the area by subcutaneous injections. Its first use in "painless" dentistry was reported on 13 December 1884 by Drs Weld and Shears "...for removing tartar, extirpating exposed nerve pulp, preparing sensitive teeth for filling, incising inflamed gums and extracting teeth" [4]. Their discovery advanced dentistry from a tooth-pulling trade into a profession that sought to preserve a patient's teeth, rather than simply extracting them. Just a week earlier, Drs R.J. Hall and W.S. Halsted reported that cocaine solutions could be infiltrated into a nerve trunk, thus blocking it and preventing the transmission of pain impulses to the brain. This could be applied to nerves that supplied portions of the jaw, thus extending the possibilities of dental surgery, or to the spinal column. This latter discovery is attributed to James Corning (1885), though credit is usually given to the German surgeon August Bier who in 1898 reported the first operation (on the ankle) on a patient whose sensations of pain had been blocked by a 15mg "cocainization" of the spinal cord [5].

Disadvantages of cocaine

But the local anaesthesia induced by cocaine injections was not without its disadvantages:

- Cocaine solutions became mouldy on storage, so they had to be freshly prepared for the patient
- A ready supply of the drug led to self-experimentation by doctors and dentists with the result that addiction became a serious problem
- To "freeze" a tooth before an extraction or a filling required a root injection of about 15 mg of cocaine (hydrochloride). But some individuals were remarkably sensitive to the drug and a fatal dose could be as little as 18 mg, provoking collapse and in rare cases, death from a heart attack or brain haemorrhage. In some cases, "near misses" in the dental chair caused practitioners to revert to ether or chloroform anaesthesia, with their attendant disadvantages [6].

Having established that anaesthesia could be induced as the result of an injection, the search began to discover other agents that could achieve a similar end without cocaine's disadvantages. One approach, typified by Oskar Liebreich, a German chemist turned pharmacologist, apparently involved the injection of any chemical seemingly to hand into some poor creature and then observing the result. Surprisingly, some success was achieved with this hit-and-miss approach (see Table 1), though none of the agents found its way into medical practice [7].

Table 1: Oskar Liebreich's "local anaesthetics"

Perceived to be a local anaesthetic	Perceived not to be a local anaesthetic
Ammonium chloride, bromide and sulphate	Ammonium carbonate and nitrate
Sodium bromide	Potassium bromide
Lead acetate	Zinc salts, generally
Hydroquinone	Copper sulphate
Antipyrin (a predecessor of aspirin)	Ether
Resorcinol	Ethanol
Dilute serpent venom	Glycerol

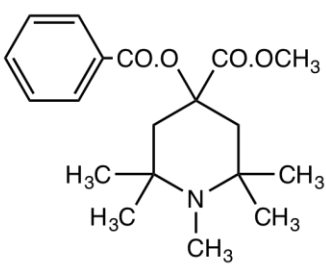
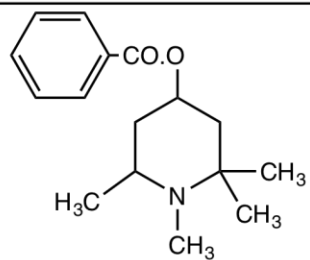
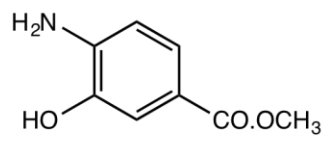
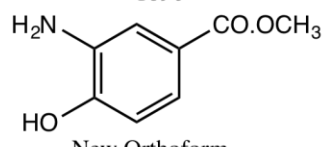
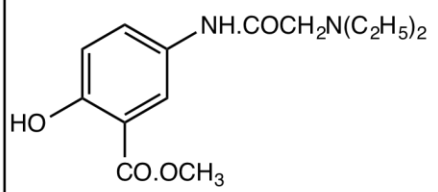
A second approach was more disciplined in that it took Willstätter's structure of cocaine and incorporated some of its key features into a succession of "synthetic" molecules:

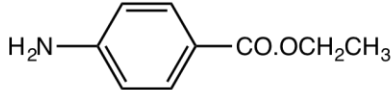
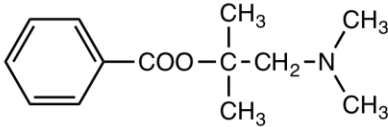
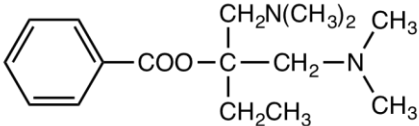
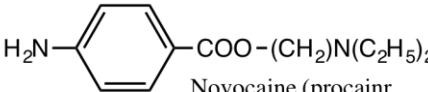
- A nitrogen atom connected to three hydrocarbon groups, one of which might profitably be a methyl.
- Ester attachments of the type $-\text{OCO}-\text{benzene ring}$, and $-\text{CO.OCH}_3$

- Incorporation of the nitrogen atom within a six membered (piperidine-type) ring.
- Constructing rings consisting solely of carbon atoms, with appropriate attachments. The cocaine molecule actually contains a *seven*-membered carbon ring to which the ester groups were attached, but the construction of such carbocycles is not easy and so researchers concentrated on the more easily accessible benzene rings to “carry” the ester groups.

Putting these ideas into practice yielded a host of molecules with local anaesthetic action. Table 2 lists some of those that entered medical practice [6]. None is addictive and all are stable in water. Where a product was achieved that was too insoluble for injection purposes, it was assessed to see if it would make a marketable anaesthetic dusting powder, say for surface application to painful leg ulcers.

Table 2: Synthetic local anaesthetics, first reported 1897 – 1904

Local anaesthetic	Comments
 <p>α-Eucaine 1895</p>	This is based on the piperidine fragment of cocaine. Less toxic, stable to boiling water thus permitting sterilisation. Non-addictive. But it was an irritant, leading to soreness at the injection site.
 <p>β-Eucaine 1896</p>	Again, this is obviously based on the piperidine ring system. As the lactate salt, it caused very little post-injection pain. A very popular alternative to cocaine 1900-1910, and its use continued until the 1930s.
 <p>Orthoform 1896</p>  <p>New Orthoform 1897</p>	Discovered by Alfred Einhorn, professor of chemistry at the University of Munich. For simplicity he chose to work on six, rather than seven membered carbocyclic rings (see text). Both species were too insoluble for injections but were used as anaesthetic dusting powders on ulcers and wounds. Until the 1930s they were used to treat the pain associated with tubercular conditions of the throat: safer and longer acting than topical cocaine applications.
 <p>Nirvanine 1898</p>	Another of Einhorn's molecules. It is structurally related to the orthoforms, but the presence of $-N(CH_2CH_3)_2$, when combined as a hydrochloride salt, confers water-solubility and hence the possibility of injection. Nevertheless, in terms of lack of irritation, it could not compete with β -eucaine.

 <p>Benzocaine 1902</p>	<p>Synthesised by Eduard Risert. Initially was reported to be free from toxic effects. Too insoluble to be used in injections but was (and still is) used topically: sunburn treatment, teething gels and in the manufacture of some condoms. The powder has been used by drug dealers as a "cutting" agent to adulterate cocaine.</p>
 <p>Stovaine 1904</p>	<p>Synthesised by Ernest Fourneau. Widely used for spinal anaesthesia at least until the early 1950s.</p>
 <p>Aylpin(e) 1904</p>	<p>First reported, medically, in 1905. Its toxicity was comparable to that of cocaine. Nevertheless it was used in the early twentieth century mainly for ophthalmic surgery.</p>
 <p>Novocaine (procaine or Scurocaine) 1904</p>	<p>Another of Einhorn's molecules. The most widely used local anaesthetic 1904-mid 1950s.</p>

The popularity and ubiquity of Novocaine for over half a century after its introduction warrants its deeper consideration. The starting molecule for Einhorn's investigation was the di-ester (II).

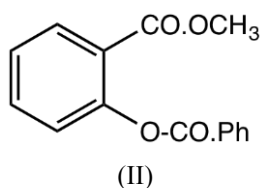


Image courtesy of:
https://en.wikipedia.org/wiki/Alfred_Einhorn

It soon became apparent that attaching the benzoyl group (-CO.Ph) to the aromatic ring (which substituted for the aliphatic cycloheptane ring in cocaine) conferred no particular advantage. Local anaesthetic action would result from a benzoic acid mono- ester. This having been established, the molecule was "tweaked" to achieve a satisfactory anaesthetic. The -NH₂ function was probably "borrowed" from the earlier benzocaine and orthoform molecules, and

the tertiary amino group was introduced to enhance water-solubility [6]. It is injected as a hydrochloride salt and thus it is a salt of a strong acid and a weak base. Its solutions will be slightly acidic giving the possibility of irritation at the site of injection. Despite the fact that this seldom occurred in practice, the 1930s saw several patents taken out to solubilise the anaesthetic with weak acids such as citric, malic or tartaric, with one patentee optimistically claiming “Furthermore, the presence of the fruit acids in the solution give it an agreeable flavour and taste, which make the solution highly agreeable as a mild surface anaesthetic for oral and nasal use” [8]. However, none of these variants was ever marketed.

There were two drawbacks of Novocaine, compared to cocaine. Its effects were more transient compared to cocaine and sometimes relatively large amounts had to be injected to achieve a satisfactory degree of anaesthesia. Cocaine had a property that Novocaine did not: it was a vasoconstrictor. This means that on injection, the blood vessels round the injection site constrict, holding the anaesthetic in place for it to exert its numbing effect. On the other hand, with no similar intrinsic effect, the Novocaine was rapidly washed away and dispersed round the body. There was, however, a neat way around this problem. In 1903 Heinrich Braun reported that adrenaline, which had recently been put on the market by the chemical suppliers Parke-Davies, was itself a vasoconstrictor. When injected alongside cocaine, it added its constricting effect to that of the alkaloid, prolonging its numbing effect. With the advent of Novocaine, Braun immediately tried it in conjunction with adrenaline and reported success in 1905 [9]. Most of us who are of pensionable age and who had dental fillings in our youth will have benefitted from Novocaine local anaesthesia. A minority of patients demonstrated an allergic reaction. This was not usually severe – a swelling round the injection site was the most common one – but it was enough to encourage the medicinal chemists to test other samples that came their way for potential local anaesthetic action. Lidocaine, first synthesised in 1943 and first marketed in 1949, was the outcome and over the next decade had all but supplanted the use of Novocaine in the operating theatres and dentists’ surgeries [10].

References

1. B.M. Duncum, *The Development of Inhalational Anaesthesia* (London: Royal Society of Medicine Press Ltd, 1994).
2. D. Cohen, *Freud on Coke* (London: Cutting Edge Press, 2011).
3. A.T. Dronsfield, P.M. Ellis and K. Pooley, *Educ. Chem.*, 2007, **44**, 183.
<http://www.rsc.org/Education/EiC/issues/2007Nov/EarlyPainFreeDays.asp>
4. H. Knapp, *Cocaine and its Use in Ophthalmic and General Surgery* (New York: Putnam, 1885).
5. A. Reis, *Revista Brasileira de Anestesiologia*, 2008, **58(4)**, 409-24. English version at:
http://www.scielo.br/scielo.php?pid=S0034-70942008000400012&script=sci_arttext&tlng=en
6. A.T. Dronsfield and P.M. Ellis, *Proc. Hist. Anaesth. Soc.*, 2008, **37**, 36.
7. A.T. Dronsfield, *Anaesth. News*, 2005, **236**, 26.
8. D. Curtis, *US Patent* US 2110826 A, 1935
9. W. Sneader, *Drug Discovery: A History* (Oxford: Wiley-Blackwell, 2005).
10. J.A.W. Wildsmith, *Proc. Hist. Anaesth. Soc.*, 2011, **43**, 9.

Note: parts of this article originally appeared in references [3], [6] and [7].

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Ramsay’s and some other Sealed Packets

Rayleigh and Ramsay’s discovery of argon; the French Academy system

Alwyn Davies [1] provides the full French text (and English translation) of William Ramsay’s sealed packet (“*pacquet scellé*” or “*pli cacheté*”) recorded by the French Académie des Sciences on 13 August 1894 under serial number 5038. The packet (first opened in 2004) contained an account dated July 1894 in which Ramsay stated that he and Lord Rayleigh were co-discoverers of a new gas present in the atmosphere which was either a “modification” of nitrogen (we would say “allotrope”) or else a new element. At that stage (in particular, not having decided which of the two things the new gas was), Rayleigh and Ramsay were not ready to publish. Fearing that they might be beaten to publication by others, Ramsay deposited the sealed packet with the French Academy to ensure that, if they *were* so overtaken by others, then they would have impeccable evidence of their own priority. In fact, the work progressed so rapidly that the “insurance” afforded by the sealed packet was needed for less than six months, and indeed proved to be insurance against an event that did not occur. On 4 August (even before the sealed packet had made its way to France and been recorded) Ramsay informed Rayleigh that the new gas indeed comprised a new element. On 31 January 1895 [2], an experimentally thorough and compellingly argued paper was received for publication by the Royal Society.

The January 1895 paper reported isolation of a new gas from the air. William Crookes had measured the spectrum of the gas and identified numerous characteristic lines. The high ratio of specific heats C_p/C_v of the gas was close the theoretical value of 5/3 for a monatomic gas. (The only gas in which such a ratio had been previously observed was mercury gas at high temperature.) The density of the gas indicated a new element “argon” with a molecular weight of around 40. Accordingly, the atomic weight of argon was also around 40, suggesting (correctly) a location after chlorine in the periodic table in a new group (now called group 18, the noble gas group [3]). This was indeed a great discovery, not only affording a new element but also supporting the hypothesis of an entire new group of elements; so, even if in July 1894 Ramsay had expected progress to be as rapid as it turned out to be, his filing of the sealed packet so as to save something from the disaster of being beaten to publication by others was arguably not a disproportionate precaution.

Davies notes that the French Academy had instituted this system of preserving evidence of priority for scientific ideas and discoveries in 1735, and that a total of 18,000 sealed packets had been deposited by 2012.

This article now draws readers’ attention, firstly, to a sealed packet of Michael Faraday’s in which he explicitly sets out the *reputational* benefit he hoped to get from the sealed packet, and secondly to the special *commercial* value given to sealed packets in French patent law.

Faraday’s sealed package in the Royal Society safe

In Faraday’s *case*, it was a theoretical idea for which he wished to secure priority [4] [5]. He composed a paper dated 12 March 1832 which was deposited, sealed, in the Society’s safe. In this paper (like Ramsay’s, now available to the public), he presciently postulated that electrical and magnetic action was not instantaneous and required time for its transmission, and furthermore that a vibratory theory would apply to these phenomena. Faraday ends his paper by explaining his fears of others claiming credit before he is ready to publish:

These views I wish to work out experimentally; but as much of my time is engaged with the duties of my office, and as the experiments will therefore be prolonged, and may in their course be subject to the observation of others; I wish, by depositing this paper in the care of the Royal Society, to take possession as it were of a certain date, and a lone right, if they are confirmed by experiments, to claim credit for the views at that date: at which time as far as I know no one is conscious of or can claim them but myself.

Sealed packets under French patent law; the INPI system

Patent law in France is by international standards anomalous in according value, in this case *commercial rather than merely reputational*, to sealed packets. In the French Intellectual Property Code [6], the first paragraph of Article L613-7 reads, translated, as follows:

Any person who in good faith at the date of filing or priority of a patent was ... in possession of the invention which is the subject of the patent has the personal right to exploit the invention despite the existence of the patent.

To take advantage of this exception to infringement in French law, the practice of depositing sealed packets with parties whom a court would regard as trustworthy is very widespread. A packet deposited with the French Academy would be effective; but a far larger number of packets are deposited with INPI (Institut National de la Propriété Industrielle), the French national intellectual property office (with which patent applications may also be filed). INPI receives more packets *in each year* than the French Academy has received over the entire lifetime of its system. INPI receives annually over 40,000 sealed packets (under the name *enveloppes Soleau*) [7], charging, as of 2 November 2016, fifteen euros for each five years that the packet is kept [8].

So if A deposits an *enveloppe Soleau* describing an invention, and later B files a French patent application and sues A for patent infringement, then company A can have the *enveloppe* opened and can plead the exception to infringement provided by Article L613-7. (The significance of the word “personal” in the Article is that the French patent is still enforceable by B against others who have no exception to rely on. The words “in good faith” exclude the case where A got details of the invention from B in confidence and then abused the confidence by filing the *enveloppe Soleau*.)

In giving such commercial protection to a secret idea, even a paper proposal or a pure laboratory result, France is out of line with other countries. In the UK, for instance, if B were to sue A under an equivalent UK patent, the production of the *enveloppe* (or of any other evidence showing A had prior independent secret knowledge of the invention) would not alone be a sufficient to avoid the Court’s finding infringement: there is an exception only for prior secret *commercialisation* (or serious and effective preparation therefor) undertaken in good faith [9].

If in the UK one does not presently want to invest in commercialisation of an invention, while wishing to preserve one’s option later to do so without the risk of being blocked by subsequent third-party patent applications, then the only possibilities are:

- (i) to file one’s own patent application – which is expensive and means that the invention will be published 18 months later – or
- (ii) simply to publish (in which case the invention goes into the public domain).

As a matter of public policy, the UK patent law gives only minor benefit to those who keep their inventions secret.

This difference reflects a more general issue of patent law in Europe. In thirty-eight states (geographically spread from Turkey to Iceland as of 2 November 2016 and including all EU states) [10], the written law on the law on the *granting, validity, and interpretation* of patents has been harmonised to a remarkable degree, in a process that began in the 1970s; any residual variation arises mostly from the inevitable variation between the approach taken by different courts, which can arise within a jurisdiction as well as between jurisdictions. In contrast, the written law on infringement has not been harmonised to the same degree, which allows (*inter alia*) the variation between the French code and the UK statute just discussed. The recent Agreement on the Unified Patent Court [11] will, if it comes into force, effect significant harmonisation of infringement law within the EU subset of the thirty-eight states. However, even in that Agreement, the French anomaly was expressly not addressed. Article 28 reads (author's italics):

Any person, who, if a national patent had been granted in respect of an invention, would have had, in a Contracting Member State, a right based on prior use of that invention *or a right of personal possession of that invention*, shall enjoy, in that Contracting Member State, the same rights in respect of a patent for the same invention [when under consideration by the EU Unified Patent Court].

The French sealed packet systems seem destined to flourish for many more years.

References

1. Alwyn Davies, *RSCHG Newsletter*, summer 2016, **70**, 33-37.
2. Lord Rayleigh and William Ramsay, *Proc R Soc London*, 1895, **57**, 265-287.
3. Group 18 has been the IUPAC recommendation since 1988 (<https://iupac.org/what-we-do/periodic-table-of-elements/>), though previously the group was known as Group 0. The term “inert gases” (“argon” itself was derived from the Greek for “inactive”) was used until the discovery of XePtF₆ - see N. Bartlett, *Proc. Chem. Soc.*, 1962, 115-116. After this, the group was renamed by analogy with the term “noble metal”.
4. L. Pearce Williams, *Michael Faraday – A Biography* (London: Chapman & Hall, 1965; New York: Da Capo paperback reprint, 1987), p. 181 (Da Capo edition).
5. James Hamilton, *Faraday – The Life* (London: Harper Collins, 2002), pp. 257-258.
6. *Code de la propriété intellectuelle* (consolidated version 25 April 2016) available as <http://www.wipo.int/edocs/lexdocs/laws/fr/fr/fr500fr.pdf>
7. *2014 en chiffres* (INPI, Courbevois, France, 2015), available as https://www.inpi.fr/sites/default/files/inpi_rapport_data.pdf, and previous annual versions of essentially the same publication.
8. *L'enveloppe Soleau* (INPI, Courbevois, France), https://www.inpi.fr/sites/default/files/brochure_enveloppe_soleau.pdf.
9. UK Patents Act 1977 (as amended), Section 64, available, like all UK statutes, under <http://www.legislation.gov.uk/>. To understand how the wording of this leads to the conclusion above, see standard patent law texts such as the current edition of the *CIPA Guide to the Patents Acts* (London: Sweet and Maxwell).
10. For a map showing the thirty-eight states (members of the European Patent Organisation), see [http://documents.epo.org/projects/babylon/eponet.nsf/0/8C003885190F73D2C1257EEE002E4EBB/\\$File/European_patents_coverage_en.png](http://documents.epo.org/projects/babylon/eponet.nsf/0/8C003885190F73D2C1257EEE002E4EBB/$File/European_patents_coverage_en.png). When the system in question commenced with the opening of the European Patent Office on 1 June 1978, only the following states participated: three large states UK, France, and Germany; the three “Benelux” states; Sweden (not then a member of the predecessor of the EU); and Switzerland (not a member of the EU even today), see <http://www.epo.org/about-us/organisation/member-states/date.html>.
11. *Agreement on a unified patent court*, <https://www.unified-patent-court.org/sites/default/files/upc-agreement.pdf>. The agreement has been signed (as of 2 November 2016) by all EU member states other than Spain and Poland. The non-signature of Spain and Poland is not fatal: if ≥ 13 of the states which *have* signed (of which three must be the UK, France, and Germany) proceed to the next step of “ratification”, then the Agreement will come into force with respect to those ≥ 13 states. The referendum in favour of Brexit has cast doubt on the timing and likelihood of UK ratification, with the result that future of the Agreement is in peril.

Michael Jewess

Two Hundred Years of Turmeric

Turmeric is obtained from the rhizome of *Curcuma longa* L. and is the “most popular yellow colorant in the world” [1]. The Latin name *Curcuma* is derived from the Arabic word, Kourkoum, which was the original name for saffron [2]. The average annual production of turmeric in India for the years 2005–2009 was over 800,000 tonnes, mostly used as a significant component of colourful curries [3].

The history

Chemists became interested in turmeric in the early nineteenth century, which was then known as *terra-merita* or *de safran des Indes*, and the first report on the colouring component was made by Pelletier and Vogel in 1815 [4]. They named the colorant *curcumine*. The solvent extraction procedure used by Pelletier proved to be a winner for investigating plant compounds. Pierre Joseph Pelletier (1788–1842) was appointed adjunct professor of natural history at the *École de Pharmacie* in 1815 and remained there for the next twenty-five years, becoming director in 1832. He was the co-discoverer of quinine, caffeine and strychnine among many other compounds [5, 6].

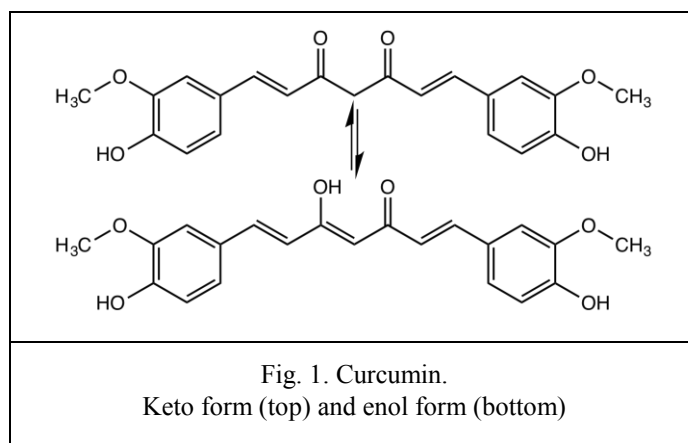
Their procedure was later (1842) summarised and improved and with an added elemental analysis by A. Vogel Jnr of Munich [7]. Perkin and Everest described the isolation of curcumin from turmeric thus:

Pelletier and Vogel's method of isolating the curcumin consisted in first removing the fatty, resinous, and other impurities by extracting pulverised turmeric with water and carbon disulphide, then dissolving out the colouring matter with boiling alcohol, and purifying it by successive solution in ether and alcohol, precipitation with lead acetate, and subsequent treatment with hydrogen sulphide and extraction of the product with ether. It was thus obtained as an amorphous yellow powder. [8]

Although Vogel presented elemental analysis figures for his product in 1842, he declined to suggest a molecular formula. His product was not at all pure, being liquid at 40°C, and any derived formula would have been incorrect. Throughout the nineteenth century researchers attempted to determine the molecular formula of curcumin without much success. In 1882, Jackson and Menke, working in the chemistry laboratory at Harvard University, summarized the progress [9]. Of ten publications, they remark "[p]assing over a number of unimportant notices ...", there were three of note in 1870. Friedrich Daube extracted turmeric with benzene and purified the curcumin via the lead salt to give a product with m.p. 165°C and assigned a formula $C_{10}H_{10}O_3$ [10]. Iwanof-Gajewsky crystallized his product from ether or benzene to give crystals with m.p. 172°C and yielding an empirical formula C_4H_4O [11]. Kachler obtained a non-crystalline product and found the same formula [12]. Jackson and Menke declared that all these results were wrong: "The formula of curcumin is $C_{14}H_{14}O_4$, as proved by analyses of curcumin itself, of its potassium salts, and its parabrombenzyl ester". But they were wrong too. The first correct result ($C_{21}H_{20}O_6$) was obtained, nearly a century after the first report on curcumin, in 1910 [13]. The source of the problem of the purification of curcumin only became apparent when it was shown that there were actually three yellow components in turmeric [14]. These three are curcumin (see Fig. 1), a compound with one less methoxy group, demethoxycurcumin, and a compound with no methoxy groups, didemethoxycurcumin, or sometimes named bisdemethoxycurcumin.

Modern extraction

More recently, new extraction techniques were used to obtain the three yellow components in *Curcuma longa* [15]. Dried, crushed rhizomes (1 kg) of *Curcuma longa* were extracted in a Soxhlet apparatus with light petroleum (b.p. 40–60°C) (3 dm³) for twenty-four hours. The extraction was continued with benzene (3 dm³) for 72 hours. Evaporation of the benzene extracts gave an orange powder (10.6 g). A separation of the components from 3 g was effected using preparative liquid chromatography on silica gel plates eluting with chloroform-ethanol (25:1). Three orange bands were separated, and extraction of each with acetone gave curcumin (1.46 g), demethoxycurcumin (0.53 g) and didemethoxycurcumin (0.7 g) which were each comprehensively characterised using elemental analysis, MS and NMR (they all exist as the enol form in CDCl₃).



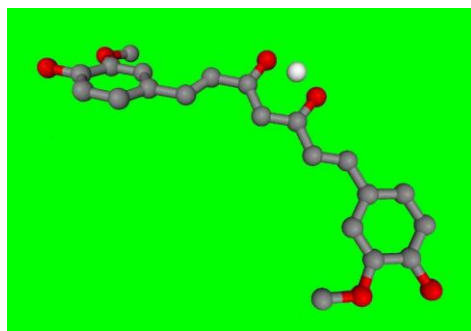


Fig. 2. X-ray structure of curcumin in the solid state showing the enol form [16]

References

1. D. Cardon, *Natural Dyes: Sources, Tradition, Technology and Science* (London: Archetype Publications, 2007), p. 318.
2. T. Esatbeyoglu, P. Huebbe, I. Ernst, D. Chin, A.E. Wagner and G. Rimbach, "Curcumin – From Molecule to Biological Function", *Angew. Chem. Int. Edit.* 2012, **51**, 5308–5332.
3. <http://turmericworld.com/production.php> (last accessed 15 September 2016).
4. A. Vogel and J. Pelletier, "Examen chimique de la racine de Curcuma", *Journal de Pharmacie et des Sciences Accessoires*, 1815, **1**, 289–300.
5. J. Wisniak "Chemistry of resinous gums, dyes, alkaloids, and active principles-contributions of Pelletier and others in the nineteenth century", *Indian Journal of History of Science* 2013, **48**, 239–278.
6. *Encyclopædia Universalis* <http://www.universalis.fr/encyclopedie/pierre-joseph-pelletier/> (last accessed 15 September 2016).
7. A. Vogel, *fiis*, "Sur la curcumine", *Journal de Pharmacie et de Chimie* 1842, **ser 3, ii**, 20–27. Summarised as "Curcumin", *Annalen der Chemie und Pharmacie* **44**, 297–298. And "On curcumine", *Philos. Mag. Ser. 3* **21**(137), 233–234, "On the action of acids on Curcumine", 234–235, "Action of alkaline substances on Curcumine", 235–236.
8. A.G. Perkin and A.E. Everest, *The Natural Organic Colouring Matters* (London: Longmans, Green and Company, 1918), Ch. XI, pp. 388–397.
9. C.L. Jackson and A.E. Menke, "On Certain Substances Obtained from Turmeric. I. Curcumin", in *Proceedings of the American Academy of Arts and Sciences*, 1883, **17**, 110–124.
10. F.W. Daube, "Ueber Curcumin, den Farbstoff der Curcumawurzel", *Ber. Dtsch. Chem. Ges.*, 1870, **3**, 609–613.
11. Y. Iwanof-Gajewsky (title not given) A report of presentations at a meeting of the Russian Chemical Society held on 7–19 May 1870 in Petersburg (*sic*) by von Richter (no initials). *Ber. Dtsch. Chem. Ges.*, 1870, **3**, 622–626, especially pp. 624–625.
12. J. Kachler, "Notizen über das Curcumin", *Ber. Dtsch. Chem. Ges.*, 1870, **3**, 713–716.
13. J. Milobedzka, Sv. Kostanecki and V. Lampe, "Zur Kenntnis des Curcumins", *Ber. Dtsch. Chem. Ges.*, 1910, **43**, 2163–2170.
14. K.R. Srinivasan, "A chromatographic study of the curcuminoids in *Curcuma longa*, L", *J. Pharm. Pharmacol.*, 1953, **5**, 448–457.
15. P.J. Roughley and D.A. Whiting, "Experiments in the biosynthesis of curcumin", *J. Chem. Soc., Perk. Trans. 1*, 1973, 2379–2388.
16. S.P. Parimita, Y.V. Ramshankar, S. Suresh and T.N. Guru Row, "Redetermination of curcumin: (1*E*,4*Z*,6*E*)-5-hydroxy-1,7-bis(4-hydroxy-3-methoxyphenyl)hepta-1,4,6-trien-3-one", *Acta Cryst. E*, 2007, **63**, o860–o862.
17. Y. Manolova, V. Deneva, L. Antonov, E. Drakalska, D. Momekova and N. Lambov, "The effect of the water on the curcumin tautomerism: a quantitative approach", *Spectrochim. Acta A*, 2014, **132**, 815–820.

Chris Cooksey

BOOK REVIEWS

Brian Iddon, *Science and Politics: An Unlikely Mixture* (Cirencester: Mereo Publishing, 2015). Pp. 308. ISBN 978-1-86151-364-9. £15.75 + £3.00 postage direct from the publishers (paperback), £4.50 (Kindle edition).

I'm a great supporter of the biographical approach to chemical history and I suppose the books which most influenced me in my youth were Partington's *A Short History of Chemistry* (1937), Tilden's *Famous Chemists: The Men and their Work* (1921) and Kendall's *Young Chemists and Great Discoveries* (1939). More recently I've enjoyed Historical Group member Bill Brock's writings on Justus Liebig (1997) and William Crookes (2008). Would that he might write one on another hero of mine from the nineteenth century: Robert Bunsen. Autobiographical accounts from the chemists themselves have featured less often in my life, but I remember well Robinson's *Memoirs of a Minor Prophet* (1976) which gave me some background for some articles I was writing on the early history of mechanistic organic chemistry.

An autobiography of a still-living chemist will be useful to future generations of chemical historians as it will give insight into her/his career development and, from a personal perspective, what contributions she/he made to the world of chemistry.

Brian Iddon and I connect in that we have both been associated with the University of Salford. I was a student there and Brian a much respected and popular lecturer from 1966 to 1997. In 1997 he was elected to the House of Commons as Member for Bolton South-East and left the teaching staff of the University. This present volume (one of two) covers his chemical life. The second book, when it appears, will deal with his parliamentary career.

Brian gives us an engaging account of his childhood in Tarleton, a rural village between Preston and Liverpool. When he was eleven, his mother told him that a boy in the village had put his chemistry set up for sale. This was not one of the boxed varieties that featured in the Christmas stockings of the era, but a "proper" collection of apparatus and chemicals. Purchased at a cost of 14 shillings 6 pence (= 76p, or about £15 in today's money) this was Brian's introduction to home chemistry. Like me, he was fascinated by the subject and like me, it led to a satisfying career. Brian studied for his BSc at Hull and continued there researching for a PhD in organic chemistry. At Salford, his specialism was heterocyclic chemistry, in part seeking novel anti-cancer compounds. He gives us an insight into the workings of a relatively new university, one with one of the largest chemistry departments in the country, and for this his book will be of value to future historians of chemical education.

However, most readers of this review will be familiar with Brian as an enthusiastic populariser of chemistry, especially with his classic lecture *The Magic of Chemistry*, travelling the country, delivering it to venues large and small. Certainly it was spectacular, much in the same way that Colonel Brian Shaw's famous lecture on *Explosives* was. From memory, though, it was less noisy, and for me, less terrifying. This book is good value if purchased as a Kindle edition. Some Amazon sellers are presently offering it at a price a little cheaper than the publishers, but the books only include black and white illustrations.

Alan Dronsfield

Mary Virginia Orna (ed.), *Science History: A Traveler's Guide* (Washington: ACS Symposium Series 1179, 2014). Pp. 384. ISBN 978-0-8412-3043-9. £97 (hardback), £32.99 (paperback).

The genesis of this book was a symposium held in Salt Lake City in 2009; despite its title we are told that "chemistry is the highlighted science". It has sixteen chapters, of which the first is introductory and the second an account of a whirlwind tour of scientific Europe made in 1985 by the late John Wotiz. The remainder is divided into three sections: "The British Isles" (four chapters), "The European Continent" (eight), and "Farther Afield" (two chapters). Oddly, there is no chapter on the USA.

It is not Brexitomania which makes me concentrate on the British Isles chapters (which anyway take up almost half the book), but for the delightful reason that three of the four essays are written by RSCHG members, who deliver typically elegant contributions. Robert Anderson, not an RSCHG member but chairman of our sister society SHAC, writes on *Scientific Scotland*, not just on Edinburgh and Glasgow, but with sections too on Aberdeen, St. Andrew's and Scottish industry. Peter Morris, in my favourite chapter, bravely tackles the huge subject of *London as a Center of Science*, taking us on walking tours of predictable sites but less obvious ones too, such as those at Kew and Greenwich, and includes a substantial section on Oxford. The book's editor correctly says that Peter knows London like the back of his hand, but she rightly extols the virtues of the London A to Z in her introduction. It would clearly have been difficult to include a map of London, but a few A-Z references could have been given (e.g. the RSC would appear as 1G 75); Peter does give a few GPS references. *Displaying Science in Context at the RI* by Frank James describes the rich history of this famous place largely through the eyes of its successive professors/directors. Gary Patterson deals with *Science in Cambridge*, using a chronological and collegiate approach, and rightly draws attention to the Whipple and Fitzwilliam museums. There are also two useful maps and some GPS coordinates.

The second section, "The European Continent" has eight essays, some on cities (Rome, Florence, Copenhagen) and others on areas (Southern Germany with Austria, Central and Eastern Europe) with a lone piece on the Auer von Welsbach Museum in Althoven, Austria. Again I have a favourite chapter, Mary Orna's *Paris – a Scientific Theme Park*, though I don't like the title. Clearly she knows Paris well and takes us on various walking tours, concentrating mainly on the areas of the city concerned with the Curies. Her chapter on *Rome and Northern Italy: Scientific*

Highlights is good too. Outstanding is the exhilarating account by Jim and the late Jenny Marshall on *Northern Scandinavia – an Elemental Treasure Trove*. This principally concerns the lanthanides, their sources and discoverers. Typically of the Marshalls' papers this does have good, clear maps – the best in the book – together with GPS coordinates.

The last section "Further Afield" is concerned with scientific sites in ancient Israel, and the concluding chapter on *Flights of Fancy* spreads its net to World Heritage and other sites in Egypt, China, Peru and Mexico in what amounts to virtual or armchair tours of these places.

This is a curate's egg of a book, the ambitious product of a conference, lacking much plan or cohesion but containing some outstanding contributions. The volume cries out for maps, but there are few of these: however, most authors give GPS (Global Positioning System) coordinates, and the first chapter has a useful introduction to GPS. There are many illustrations, all monochrome, some of poor quality. Most chapters give good and specific instructions on how to reach the sites, and often admission times and prices for museums are given. There is a very short Author Index, and an adequate Subject Index. The price for the hardback edition is exorbitant, and on the high side for the paperback: even the latter would be quite bulky to carry around for a city tour. Still, a book well worth dipping into before your next holiday.

Bill Griffith
Imperial College

Raymond G. Stokes and Ralf Banken, *Building on Air: The International Gases Industry, 1886-2006* (New York: Cambridge University Press, 2016). Pp. xvii + 465. ISBN 978-1-107-03312-2. £64.99 / \$99.99 (hardback).

It is perhaps surprising that historians haven't focused more of their intellectual attention on the industrial gases industry or the "invisible industry" as the International Oxygen Manufacturers Association in Cleveland, Ohio has referred to it. The gases at the core of the industry - oxygen, nitrogen and the rare gases - are all around us in the atmosphere and provide a rare 'free' resource for industry to exploit for commercial benefits. Interestingly, manufacturers of the first gas to be widely produced and distributed, carbon dioxide, were never considered part of the industrial gases industry. It was the production of oxygen on a large scale using a barium oxide process developed in France by Arthur and Leon Quentin Brin and its commercial exploitation by the British firm Brin's Oxygen Company in 1886 that was to initiate the industrial gases industry. In 1906 this company was rebranded British Oxygen Company, a name with which readers will be more familiar. The initial focus on oxygen was because of its demand for the increasing use of limelight in theatres and the development of oxy-acetylene welding and cutting techniques.

The technical innovation that followed the work of the Brin brothers is remarkable in its diversity but also in the short timescale in which technical progress on gas manufacture was achieved. While developments took place in many different countries (reflecting the international nature of the industry), the really major steps forward were due to two innovators, Carl Linde in Germany and Georges Claude in France. It was Carl Linde who set up a company in Wiesbaden in 1879 and later went on to develop and patent air liquefaction technology that by 1895 was able to liquefy several litres of air. Later he switched to cryogenic technology and developed rectification or fractional vapourisation. By 1910 Linde had developed the double-column rectifier that could separate oxygen and nitrogen simultaneously. Georges Claude on the other hand turned his attention to piston technology to improve Linde's work and established Air Liquide in 1901. Each stage of the technical advance was patented and this intellectual property formed an important part of the 'trading' that went on in negotiations during business acquisitions. The major long-term companies remain Linde AG and Air Liquide and in 2012 their combined sales exceeded €15 billion, with Linde employing nearly 62,000 and Air Liquide about 50,000.

This book is not the first to tackle the history of this important industrial sector. Almqvist (2003) and Butrica (1990) focused on individual companies or just the technical aspects, but Stokes and Banken set out from the start to cover the development of the industry "in its full technological, business, industrial and international dimension". This proved a formidable task that occupied about nine years and involved gaining access to and scrutinising a vast collection of archival material held by many different international organisations and companies. It was the acquisition of British Oxygen Company by the German firm Linde AG in 2006 that prompted the project but the authors were aware that it was not possible to focus just on the Linde AG part of the story but necessitated taking a wider view of the industry and in particular the international changes since 1886. The resulting book provides a thorough but complex story driven by management of intellectual property and company acquisitions on a global scale. It is an important book that fills a gap in our understanding of this industrial sector. The only criticism is that readers would have benefited from having some flow-charts or other graphical representation recording company acquisitions for use as a ready reference as they progressed through the book. It will be of principal interest for economic, business and industrial historians, but historians of chemistry will find much of interest, especially the early chapters covering the main technical developments associated with the industry.

Peter Reed

MEETING AND CONFERENCE REPORTS

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

The RSC Historical Group Meeting held in Burlington House, in conjunction with the History Group of the Institute of Physics, on Wednesday 19 October 2016 included six talks about Henry Moseley's life and legacy. The first three talks dealt with Moseley's life. Moseley's research career lasted less than four years but in two ground-breaking papers published in 1913 and 1914 he showed that the frequencies of X-ray lines could be linked to a number allocated to each element and that this number could be equated with the charge on the nucleus. He was killed in Gallipoli on 10 August 1915 while serving as a signals officer in the Royal Engineers.

The first talk entitled "Henry Moseley – the formative years" was given by Clare Hopkins, Archivist of Trinity College Oxford. Between the ages of thirteen and twenty-two, Henry Gwyn Jeffreys Moseley attended two of Britain's most elite institutions: Eton College, and Trinity College, Oxford. He received an education that was to shape both his scientific ambitions, and his military career. Using published sources, archives, letters, and memoirs, her talk examined how he was taught, and the different ways in which he took advantage of, but was frustrated by, the educational opportunities that were available to him. It considered the relationships and experiences that had the greatest influence on his life, and analysed his academic and social development during this important stage.

Next Neil Todd, of the Universities of Manchester and Exeter, dealt with "Moseley in Manchester". His lecture gave an overview of what was going on in Manchester physics before, during and immediately after Moseley's short time in Rutherford's group and gave a picture of his life outside of the laboratory. He started with a brief review of the origin of Owen's College from 1873 and the organization of the New Physical Laboratories of the University of Manchester, which opened in 1900. He then talked about Rutherford's preoccupations from 1908 until Moseley's arrival in 1912, including the discovery of the nuclear atom. Next Dr Todd gave an impression of what it would have been like for Moseley in and outside of the laboratory. Of particular importance was the interaction that Moseley had with Niels Bohr and the ideas developing around the early quantum atom in 1913. Finally, the talk dealt with what happened in the years immediately after Moseley left Manchester during the War.

The final phase of Moseley's life was taken up in the next talk: "Sacrifice of a genius: Henry Moseley's role as a signals officer and signaling in the Gallipoli campaign" given by Liz Bruton, formerly a research officer at the Museum of History of Science, Oxford. This paper was based on in-depth research conducted as part of the Heritage Lottery Fund (HLF) funded centenary project and exhibition "Dear Harry: Henry Moseley, a Scientist Lost to War" at the Museum of the History of Science, Oxford. The talk focussed on Moseley's brief time as a Royal Engineer Signals Officer, for just under a year between October 1914 and August 1915. It began with his officer and signalling training in the UK in late 1914 and early 1915 before exploring his brief service as a Signals Officer at Gallipoli in July and August 1915. Moseley's death in combat at Gallipoli on 10 August 1915 was widely lamented at the time with contemporary newspaper headlines including "Sacrifice of a Genius" and "Too Valuable to Die". The international scientific community was also fleetingly re-united in its condemnation of the loss of such a scientific talent, and Moseley's death led to wider changes in the way that science, scientific research, and scientists were used in war. While Moseley's scientific talents were truly exceptional, his death as a signaller was not and he was one of many signallers and soldiers on both sides to be killed at Gallipoli. Dr Bruton concluded her talk with a wider consideration of signalling and the importance of signallers to all involved in the Gallipoli campaign, as well as the overall outcomes of the campaign.

The three talks about Moseley's legacy started with "Henry Moseley and the Politics of Nobel Excellence" by Robert Marc Friedman, from the University of Oslo. At first glance, Svante Arrhenius' inclusion of Henry Moseley in nomination letters to the Nobel Committees for Physics and for Chemistry for the Prizes to be decided in 1915 might seem unproblematic. Moseley was unfortunately not awarded the Prize; although formally he could have received a Prize as he was nominated prior to being killed at Gallipoli. Some commentators have asserted that the surprising Prize to C.G. Barkla in 1918 (the previously reserved Prize for 1917) was a form of tribute to Moseley while the Prize to Manne Siegbahn in 1925 (the previously reserved Prize for 1924) was in part also a means of honoring Moseley. However, reading the nominations and then the evaluation reports without an appreciation of the context of how the committees worked at this time and what scientific orientations were represented in the committees can easily result in missing much of the meaning of these episodes. The challenge of maintaining the appearance of neutrality and impartiality in spite of conflicting strong sentiments in the committees during wartime and the immediate postwar years must be taken into account when making sense of these Nobel proceedings. Friedman's talk offered an analysis of the Moseley's seminal contributions within the Nobel system based on an appreciation of the broader practices, agendas, and biases – scientific and political – of the committees.

The next talk by Russell Egdell, of the Department of Chemistry, University of Oxford, considered three aspects of "Moseley's Legacy". Firstly, he described the background to Moseley's posthumous award of the Italian Matteucci Medal (an international award in physics that predated the Nobel Prize by over thirty years) in 1919, ahead of Einstein and Bohr who received the medal in 1921 and 1923 respectively. Secondly, he considered the role of X-ray spectroscopy in assessing the veracity or otherwise of claims for the discovery of new elements. Particular attention was given to Hafnium and Technetium, with a digression into the purported discovery of primordial superheavy elements in the 1970s. Finally, he described how X-ray spectroscopy has evolved in the past century to become both

a workhorse technique in chemical analysis and a technique at the forefront of fundamental investigations of electronic structure.

The final talk “Re-climbing Moseley’s Staircase” was presented by Justin S. Wark, from the Department of Physics, University of Oxford. Moseley’s staircase’ refers to the striking photograph demonstrating the regular and rising frequency of the K-alpha transitions of the elements as a function of atomic number, a feature that allowed Moseley to order correctly the elements in the periodic table. A century later, using a novel femtosecond source several billion times brighter than that used by ‘Harry’, one can create ions with varying numbers of electrons within an elemental solid. Observation of the K-alpha emission from these ions of a single element is akin to making a tiny staircase up the riser of a single Moseley step. The essential similarity of these experiments with those conducted by Moseley was emphasized.

The meeting also included an address by Counsellor Mr Cem Işık of the Embassy of the Republic of Turkey, concluding with Kemal Atatürk’s words of reconciliation between the Allied and Ottoman forces, the full text of which is given below. The organisers of the meeting would like to thank Gordon Woods and Clare Hopkins for a small exhibition of documents and photographs; and Christelle Petiot from Oxford Instruments for demonstrating a handheld X-ray fluorescence spectrometer during breaks at the meeting. They are also grateful to the several surviving great and great-great grandchildren of Moseley’s sister Margery who attended the meeting and provided new material from the family archive that was included in Clare Hopkins’ talk.

Russell Egdell
University of Oxford

Speech Delivered at by Counsellor Mr Cem Işık, Deputy Head of Mission, of the Embassy of the Republic of Turkey

It is a great honour and a privilege to speak here at this one-day conference to honour the memory of Henry Moseley. Let me thank the organisers wholeheartedly. The Gallipoli Battles of the First World War marked a turning point in the history of our nations.

These battles are remarkable in many senses as they:

- changed the course of history,
- had a wide range of repercussions beyond the battlefields,
- were a defining moment of my nation’s resurrection,
- and affected many countries’ nation building processes.

However, the battles are unique in a sense that strong friendships came out of them, and they have always been defined and remembered as the “War of Gentlemen” along the years.

The Gallipoli campaign was fought on a terrain which became the Ottoman Empire’s first foothold in Europe in the fourteenth Century. It was the site of the Trojan Wars, of the Greco-Persian Wars, of Hero and Leander. But this place is today a bridge. It is a bridge between Europe and Asia, a bridge between East and West. And indeed today, it is a bridge over which old enemies get together in arms and commemorate all losses side by side, shoulder to shoulder.

The Gallipoli Campaign has military, historical and above all humanitarian aspects. Young men in their prime just like Henry Moseley, sent by their parents from overseas, displayed supreme acts of heroism and humanity. They did not hesitate to shoulder their wounded opponents, and carry them to medical remedy under heavy fire.

With your permission, I would like to tell you a very short but true story of Kınalı Ali. Kınalı means “dyed hair with henna”.

A hundred years ago, Kınalı Ali, a Turkish soldier in the Gallipoli Battles, wrote a letter to his mother. At the end of the letter, Ali left the following note about his younger brother Ahmet, who was soon to be sent to the front lines.

Mother you put henna on my hair. My commanders and friends are making fun of me. Please do not put any henna on Ahmet’s hair, so they don’t make fun of him.

Shortly after this letter, Ali was sent to the front lines, too. That day almost all of Ali’s squadron lost their lives, Ali was one of the martyrs. After some time, a letter reached Ali’s commander from his mother. The original text of this letter is displayed at the Gallipoli Museum.

My son Ali, you said that ‘they made fun of the henna on your hair, that I shouldn’t put any on your brothers’ hair’. Tell your commander and your friends not to make fun of you. We put henna on three things over here. Firstly, on a newly married bride, for her to go to her new family and sacrifice herself to children. Secondly, on the sheep to be sacrificed for God. Thirdly, to our sons going to military service to be sacrificed for the motherland... so your brother will arrive the front with henna on his hair.

The day of 25 April 1915 was the beginning of a venture that lasted for eight and a half months. At the Gallipoli Campaign, the total number of casualties and losses from both sides was over half a million. And it wasn't long before both the Turks and the Allies realised that the enemy that they were fighting was human, that there was no difference between their pain, suffering, or deaths.

And here, I would like to repeat the words of Mustafa Kemal Atatürk, the founder of our nation, for those that didn't make it back, like Henry Moseley:

Those heroes that shed their blood and lost their lives... You are now lying in the soil of a friendly country. Therefore rest in peace. There is no difference between the Johnnies and the Mehmets to us, where they lie side by side here in this country of ours... You, the mothers, who sent their sons from far away countries, wipe away your tears; your sons are now lying in our bosom and are in peace. After having lost their lives on this land, they have become our sons as well.

Today, the nations who fought in the opposite trenches in Gallipoli are all friends and Allies. More specifically, Turkey and the UK enjoy excellent bilateral relations based on strong bonds of friendship, strategic partnership and Alliance. Our relations have strong roots based on a glorious past as our countries have been key actors during the most important events in modern history. In this regard, the Gallipoli Battles offer a unique example for the world as an illustration of ties of friendship which are born out of wars.

The most important message conveyed from Gallipoli to the present day is that peace is essential. The Commemoration Ceremonies held in Turkey last year on the one hundredth anniversary of these battles, and attended by His Royal Highness the Prince of Wales were of special importance as they provided an invaluable opportunity to send this message of global peace to the entire world. It is with these feelings and thoughts that I wish for those who gave their lives in Gallipoli, including Henry Moseley, whose memory we honour here today, to rest in peace.

Counsellor Mr Cem Işık
Embassy of the Republic of Turkey

Editor's Note: When corresponding with Counsellor Mr Cem Işık following the meeting he mentioned that he had subsequently researched the loss of academics and scholars on the Turkish side. His findings underline the tragedy of Gallipoli for that generation. He writes:

Galatasaray, Konya and İzmir High Schools (normally very big schools) did not have a single graduate in 1915. And because 2,500 first year medical students left their university in 1915 and rushed to the battlefields of Gallipoli, the University of Istanbul Faculty of Medicine did not have a single graduate in 1921 (six years on).

RSC NATIONAL CHEMICAL LANDMARKS

Dalton Anniversary Celebrations, Manchester, 26 October 2016

2016 marked the 250th anniversary of John Dalton's birth. He was born into a Quaker family, probably on 6 September 1766, but curiously his name was not entered in the Quaker register. For various reasons, it was not possible to celebrate the anniversary in September, so a more convenient date of 26 October 2016 was chosen.

Dalton was born at Eaglesfield in Cumbria and spent his early years there. He moved to Kendal in 1781 to teach at a school run by his brother. He benefited from the informal tuition of Elihu Robinson in Eaglesfield and John Gough at Kendal. They encouraged him to develop his interests in natural history, mathematics, and natural philosophy. In 1787, encouraged by Gough, he started a detailed daily weather record, continuing without fail until the day before his death fifty-seven years later. At Kendal he started giving public lectures on various scientific topics, and in 1793 published his first book *Meteorological Observations and Essays*. That year his scientific activities resulted in his appointment as a teacher at the New College in Manchester.

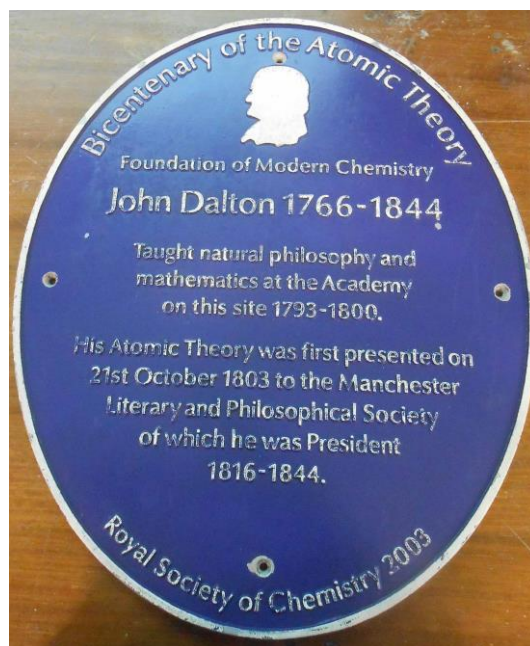
Manchester is where Dalton remained, and where he did all his subsequent scientific work. He joined the Manchester Literary and Philosophical Society, and published many papers in its *Memoirs*. His first paper was on colour blindness, from which he himself suffered. It was the first scientific description of the condition, which is still sometimes known as Daltonism.

Dalton is of course primarily remembered for his atomic theory, the first hint of which he published in 1803. Lavoisier had in 1789 given the modern definition of an element as a substance that cannot be decomposed into anything simpler. The concept that matter might ultimately be composed of minute indivisible atoms had first been suggested in ancient Greece, but Dalton proposed that each of Lavoisier's elements was composed of its own kind of atom, identical to others of the same element, but differing from those of other elements, especially in weight. He produced the first table of atomic weights, but uncertainty remained about the values for many years, because of the

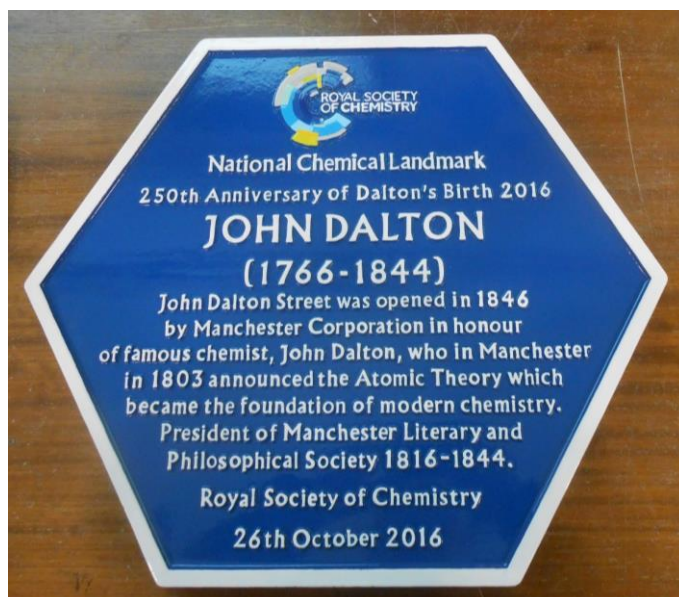
difficulty, at the time insurmountable, of determining what we would now call molecular formulae. For quantitative work, many chemists continued to use the experimentally determined equivalent weights.

But this should not blind us to the fact that Dalton's theory set chemistry along its modern path. Chemical reactions could now be explained by atoms combining to form aggregates. These compound atoms (as Dalton called them) had properties which differed from those of their constituent elementary atoms. Compounds might be decomposed back into their constituent elements, but the elementary atoms could not be destroyed or created by chemical means. Hence Dalton's atomic ideas immediately suggested a theory of chemical change which we still recognise today. Furthermore, while the attempts of the alchemists to make gold by chemical means had always met with failure, their dreams now became a theoretical impossibility.

Anniversaries provide appropriate occasions to remember significant events or personalities in the history of science. A major celebration took place in Manchester in 2003 on the 200th anniversary of Dalton's first publication on his theory, but the 250th anniversary of his birth could not be allowed to pass without also being marked. Appropriately enough, this year's celebrations were organised by Dr Diana Leitch, current President of the Manchester Lit. and Phil., and also a member of the Historical Group. Dalton was himself President of the Lit. and Phil. for twenty-eight years. Among the many guests present was Steve Howe who, soberly dressed in period Quaker costume, impersonated John Dalton.



The first part of the event took place in the Chemistry Department of Manchester University. The proceedings were opened by Professor Steve Liddle, who stressed the long association of Manchester University with atomic research. Professor David Phillips, former President of the RSC, then spoke. He described how the RSC, whose precursor the Chemical Society had been founded three years before Dalton's death, had as part of its mission the aim of improving the public perception of chemistry and chemists. He cited recent research which had shown that public attitudes to chemistry were more positive than anticipated. One of the many ways in which the RSC reaches out to the public is through its Landmark scheme. He then presented two Landmark plaques. The first marked the current anniversary, and will be erected in on the Ape and Apple pub in John Dalton Street. This is owned by the Manchester brewery of Joseph Holt, which commenced operations in Manchester in 1849, five years after Dalton's death. It was accepted on behalf of the brewery by Marc Brodie, the Estates Manager. The second plaque had in fact been presented before, as Sir Harry Kroto had unveiled it on the occasion of the bicentenary of the atomic theory in 2003. It had been positioned in the Peace Garden in St. Peter's Square, but it had been removed to make way for a new tram station. After its removal it had been lost, but persistent enquiries by Historical Group member Dr Gerald Hayes located it to a shed in Herefordshire, fortunately displaying only minor damage. The plaque was now presented a second time, on this occasion to the Lit. and Phil., who will display it in their offices. Sadly Sir Harry Kroto died earlier in 2016, but his widow was present to see the plaque donated to its new owners.



After a reception hosted by the RSC, we moved across the road to the Physics Department where Diana Leitch introduced the second part of the evening. This commenced with the award of a Dalton Medal. Diana explained that a Dalton Medal has only been awarded on fourteen previous occasions, the first being presented to Edward Schunk in 1898. All awardees have been eminent scientists with Manchester connections. Today's recipient was Professor Sir Kostya Novoselov FRS, Langworthy Professor of Physics and joint winner of the 2010 Nobel Prize in Physics for the discovery of graphene. After the presentation, Professor Novoselov gave a lecture entitled *The history of sp^2 carbon in England*. Novoselov described some episodes in the history of graphite and other carbon-based materials. He alluded to the first ever graphitic mines in Seathwaite (Lake District), the discovery of the structure of graphite by John Desmond Bernal, the very painful experience with Wigner energy in graphite during the Windscale fire, the discovery of fullerenes by Kroto, Smalley and Curl, and the first isolation of graphene. He concluded by referring to some current advances in carbon science and he discussed the possible future applications of some of these remarkable materials.

The event was a fitting tribute to the memory of John Dalton, and a reminder that today Manchester is at the forefront of research into modern materials. The organisation of this event was plagued with problems, and Diana Leitch is to be congratulated that it proved to be such a success.

John Hudson

REPORTS ON OTHER MEETINGS AND PLAQUES OF INTEREST

Centenary of the Opening of the Dyson Perrins Organic Chemistry Laboratory

The centenary of the opening of the Dyson Perrins organic chemistry laboratory (always known as the DP) was celebrated in Oxford on 17 September 2016. There was a lunch at Hertford College which was then followed by a lecture in the DP lecture theatre by Allan Chapman on the history of organic chemistry at Oxford. We were then given a tour of the DP which is no longer used as a laboratory except for undergraduate teaching (the main organic chemistry laboratory is the Chemical Research Laboratory on the other side of South Parks Road). The laboratories still look very much as I remember them from the 1970s. The celebrations concluded with a reception in the atrium of the Chemical Research Laboratory. The event was graced by the presence of Mr Andrew Perrins, a great-grandson of C.W. Dyson Perrins, and his wife.

On Wednesday 2 November I presented the plaque marking the award of an ACS Citation for Chemical Breakthrough to Oxford Chemistry for the report of the structural determination of penicillin by Dorothy Crowfoot-Hodgkin and Barbara Rogers-Low (along with Charles Bunn and Annette Turner Jones of ICI Alkali Division), which was first published in H.T. Clarke, J.R. Johnson, R. Robinson (eds.), *Chemistry of Penicillin* (New Jersey: Princeton University Press, 1949) although the work had been carried out towards the end of the war. A sandwich lunch was partaken in the Abbot's kitchen, the university chemistry laboratory built in 1860 which is now partly a common room. In the evening, I went to a reception in the Museum of the History of Science to mark the opening of the "Back from the Dead: Demystifying Antibiotics" where I met Elizabeth Hodgkin, the daughter of Dorothy Crowfoot Hodgkin. 2016 was the seventy-fifth anniversary of the first human trials of penicillin carried out in the Radcliffe Infirmary in Oxford in February 1941. Since those trials, beta-lactam antibiotics have become a powerful

clinical weapon against infection and a success story of modern medicine. It was thus appropriate that the award ceremony was followed by a one-day symposium entitled “Do beta-lactams have a future?”.



The ACS Citation for Chemical Breakthrough is run by our counterpart in the ACS, the HIST division. The Citation was founded by Jeff Seeman in 2006 to fill the gap left by the ACS National Historic Chemical Landmarks scheme, which was not well-suited to capturing the intellectual achievements of chemistry as represented by books, papers and patents. The judging panel is made up of leading chemists and in addition, historians of chemistry, including myself. In 2016, for example, we had to consider five books, one patent and forty-two papers and generally the panel makes four (or five) awards a year. The black award plaque is then given to the relevant organisation, very often a chemistry department in a university, but, unlike the landmark scheme, it is not tied to a specific building.

Peter Morris

A Blue Plaque for Dr Alphonse Normandy

The unveiling ceremony

On Friday 23 September 2016, a blue plaque was unveiled in honour of the nineteenth-century analytical chemist, Dr Alphonse Normandy, who lived and worked at 67 Judd Street [1] between 1850 and 1859. He was elected a Fellow of the Chemical Society in 1854 and was a member of its Council between 1860-1863.

The plaque's installation and the unveiling ceremony was organised by the Marchmont Association [2], a Bloomsbury amenity group that has been running its own commemorative plaque scheme since 2009. The plaque was sponsored by the International Desalination Association (IDA) whose current President Dr Emilio Gabbrielli attended the event, along with Dr Jim Birkett a former president of the IDA and co-author of a paper on Dr Normandy, entitled “Normandy's Patent Marine Aerated Fresh Water Company: A Family Business for 60 years” [3].

Other invited guests included Ursula Annunziata, President of the European Desalination Association, Professor John Nicholson, Secretary of the RSC Historical Group, and Bob Flanagan, Chair of Friends of West Norwood Cemetery (FOWNC), where Dr Normandy was buried in 1864. Councillor Nadia Shah, Mayor of Camden joined the VIPs in attendance, as well as Dr Niki Panourgias, Alphonse Normandy's great-great-grandson. A number of local residents and a reporter from the local newspaper [4] also enjoyed the unveiling occasion, which was followed by a reception in Casa Tua, a neighbourhood restaurant, also sponsored by the IDA.

The Blue Plaque



Those shown in the photograph include the Mayor of Camden, Cllr Nadia Shah (third from right), Niki Panourgia (great-great-great grandson of Dr Normandy; centre), Debbie Radcliffe (organiser of the event; second from left); and, John Nicholson of the RSCHG on the extreme right. Photograph courtesy of Ricci de Freitas.

Discovering Dr Normandy

As Dr Birkett's co-author of the above paper, I admit that I am not a chemist and have no knowledge of desalination techniques. I do however happen to live in the house where Dr Normandy lived and worked in the mid nineteenth century, and initiated the idea of a plaque to him at this location.

During restoration of the Georgian front door in 2010, I discovered a small bronze plaque buried under several layers of thick black paint. This bore an engraving of the name M. Bates and it stimulated my curiosity as to who had lived in the house in the past 180 years. Research of Camden's Rates Books brought the name of Dr Alphonse Normandy to my attention.

Intrigued by his French origins, I did a quick internet search, and found that Dr Normandy's achievements were significant enough to warrant an entry in the *Oxford Dictionary of National Biography*. I also discovered a brief article written by Dr Jim Birkett of Maine, USA. We corresponded. Jim informed me he was giving a paper on Dr Normandy at the IDA Congress in China in November 2013 and kindly suggested we collaborate on the project. Being an enthusiastic historic researcher, I jumped at the chance. Another internet search revealed an article in the *FOWNC Newsletter*, researched and written in 2003 by Elizabeth Panourgias-Morrison, Dr Normandy's great-great grand-daughter.

The idea of peeling back the years from one century to another has always appealed to me. In his will, Dr Normandy bequeathed two pianos to his daughter Louise (from whom Elizabeth is descended). I invited Liz for tea and we conversed in the same room as her illustrious forebear might have dined in 150 years ago. There is a piano situated in the room today as well. Unfortunately, long-term illness prevented Elizabeth from being able to join us at the unveiling event, but her son Niki was able to represent the family.

Rescue from obscurity

The installation of a plaque on the face of a Grade II listed building in Judd Street required planning permission from Camden Council. During their deliberation, I was informed that the Senior Conservation Officer queried the "worthiness" of the subject, describing Normandy as being "relatively obscure".

Dr Birkett and I have long thought it surprising that Alphonse Normandy had fallen into obscurity. Perhaps he simply slipped under the fame radar due to an early death and lack of attention afterwards, except from Henry

Minchin Noad, who re-wrote Normandy's *Commercial Handbook of Chemical Analysis* in 1875, following the 1872 revision of the 1860 Adulteration of Food and Drugs Act.

Dr Normandy's Handbook was published in 1850. He was an acknowledged expert in food adulteration and his work must have had some influence on the Act itself. As well as underestimating his pioneering developments in desalination processes, we feel that posterity has also undervalued Dr Normandy's contribution to exposing commonly used but poisonous additives in food and drink. His desire to provide practical guidance to people less conversant with chemical analysis also resulted in the publication of Normandy's *The Farmer's Manual of Agricultural Chemistry* in 1853.

The research continues

Research can become addictive, especially when the subject seems to have been written out of history. But therein lies the challenge. Documents in Kew Archives and the British Library have already revealed new information about Dr Normandy's legal battles, as well as his membership of the Royal Institution, for which he was recommended by Michael Faraday and other well-known scientists of the day.

A visit to Rouen gave context to his early years in France. Genealogical websites have provided names and dates of his family and descendants. Dr Birkett has visited the remains of an 1862 Normandy multi-effect desalination unit in Key West and found evidence for other sites (such as Malta), as well as in South America where they were crucial for the development of the mining industry in Chile and Bolivia. I made a daytrip to Heligoland (a small German archipelago in the North Sea, formerly a British possession) and found myself giving information to the Librarian about Dr Normandy's important role in the island's history.

Reviving recognition and respect

We hope the plaque will help encourage a revival of interest in this nineteenth-century chemist and desalination pioneer. Dr Normandy's obituary in *The Lancet* (May 1864) ends with the words: "He has left a scientific name which will be long remembered with respect, and a personal reputation which will not be easily effaced from the affectionate recollection of numerous distinguished and sorrowing friends".

The blue plaque can be seen on the ground floor of an early nineteenth-century Bloomsbury townhouse, part of a Grade II listed terrace that lies on the west side of Judd Street, leading from St Pancras Station to Brunswick Square – in the direction of Russell Square. I watch as visitors to London pass by the house, and hope that, when they glance up at the plaque and wonder who Alphonse Normandy is, that their curiosity is aroused.

References

1. The street was renumbered in the early twentieth century and is no. 91 today.
2. www.marchmontassociation.org.uk
3. Jim Birkett and Debbie Radcliffe, "Normandy's Patent Marine Aerated Fresh Water Company: A Family Business for 60 years, 1851-1910", *IDA Journal of Desalination and Water Re-use*, 2014, 6(1) 24-32.
4. www.camdennewjournal.com/soapy-blue-plaque

Debbie Radcliffe

FORTHCOMING MEETINGS

Royal Society of Chemistry Historical Group Meetings

Chemistry and Anaesthesia: Some Historical Perspectives

Wednesday 18 October 2017, Royal Society of Chemistry, Burlington House, Piccadilly, London

The Historical Group's autumn meeting will explore historical perspectives of chemistry and anaesthesia and we will welcome members from the *History of Anaesthesia Society*. The following papers are scheduled to be given.

David Wilkinson: "Anaesthesia ignored; Why doesn't Chemistry give us the Answers?"

Frank James and John Pring: "Nitrous Oxide: From Davy to its Use in Today's Practice of Anaesthesia".

Alan Dronsfield: "Cocaine: A Chemical, Medical and Social history".

Tony Wildsmith: "Local Anaesthetics after Cocaine: An Early Structure-Activity Relationship".

Ann Ferguson: "Surgical Relaxation: Crum Brown to the Present Day".

Adrian Padfield: "Carbon Dioxide: The Original Anaesthetic Gas".

David Wilkinson: "Post Manhattan: Time for New Chemistry?"

The Group's AGM will also be held at this meeting.

Full details on the meeting will appear in the summer 2017 *RSCHG Newsletter*.

OTHER MEETINGS OF INTEREST

Society for the History of Alchemy and Chemistry Spring Meeting

New and Old Themes in the History of Chemistry: A Meeting to Honour Bill Brock and Mark Eighty Years of *Ambix*

Saturday 20 May 2017, Royal Institution, 21 Albemarle Street, London, W1S 4BS

The spring SHAC meeting will take place on Saturday 20 May 2017 at the Royal Institution. In 2017 SHAC's journal *Ambix* will be eighty years old. To mark this anniversary and the contributions made by one of SHAC's longest standing members, Bill Brock, SHAC will be holding a special meeting to explore old and new themes in the history of chemistry. Since *Ambix* was launched in May 1937, sixty-three volumes have been published, and Bill was editor of the journal from 1968 to 1983.

Programme

10.00 Registration and Coffee

10.30 **Carolyn Cobbold** (University of Cambridge)

Yeast, a Problem. The Rise of Chemical Bread Technologies in the Nineteenth century

11.00 **Rupert Cole** (UCL / RI)

'Chemist has the answer' (*The Guardian*): George Porter, a cheerleader for chemistry in post-war Britain

11.30 Coffee

12.00 **Aileen Fyfe** (University of St Andrews)

The development of non-commercial science journals, in Victorian Britain and beyond

12.30 **Sally Horrocks** (University of Leicester / BL)

'I wish I could say I had a little chemistry set at home': What does oral history really tell us about scientists' childhoods?

1.00 Lunch

2.00 **David Knight** (University of Durham)

Losers and Winners

2.30 **Hattie Lloyd** (UCL / RI)

Fashion and Chemistry - the Incongruous Union

3.00 **John Brooke** (University of Oxford)

Chemistry and Secularity: From the Most to the Least Spiritual of the Sciences

3.30 Tea

4.00 **Bill Brock** (University of Leicester)

Distilling History through the *Ambix*

4.30 Round table including Bill Brock, John Brooke and David Knight

5.30 Close

Details of how to register will be available on the SHAC website in due course: www.ambix.org or email Dr Anna Simmons, Joint Honorary Secretary on a.simmons@ucl.ac.uk

History of Anaesthesia Society - Annual Meeting

16-17 June 2017, Cedar Court Hotel, Wakefield

Non-members are welcome to attend The History of Anaesthesia Society's next Annual Meeting at the Cedar Court Hotel in Wakefield on Friday 16 and Saturday 17 June 2017. The Friday morning will be a symposium with lectures by invited speakers on the historical consideration of curare and subsequent drugs, particularly with respect to their use in surgical anaesthesia. Non-members can register for the whole meeting or just for the Friday or Saturday. There will be an outing for accompanying persons on the Friday. The Society's Annual Dinner will be held at the Waterton Park Hotel in the grounds of Walton Hall, the home of Charles Waterton who is remembered for bringing

arrow poison back from South America and for his involvement in pioneering animal experiments to elucidate its effects. The Society's website (www.histansoc.org.uk) gives up to date information on registration and the submission of abstracts.

FORTHCOMING CONFERENCES

British Society for the History of Pharmacy Conference

1 and 2 April 2017, London

The British Society for the History of Pharmacy (BSHP) is celebrating its fiftieth anniversary in 2017. To mark this milestone, the BSHP are holding a special conference in London on Saturday 1 and Sunday 2 April, open to all. The Saturday programme, hosted by the Royal Pharmaceutical Society, features talks on the Society of the Apothecaries (celebrating its 400th anniversary), the UCL School of Pharmacy (celebrating its 175th anniversary), the National Pharmacy Association (approaching its centenary) and the BSHP itself, with an afternoon of talks and tours featuring the RPS's fantastic museum and library. Attendance for these sessions is FREE for students and BSHP members, £50 for non-members. The BSHP's birthday will then be toasted at a celebration dinner in the evening at the conference hotel, the Double-Tree by Hilton, Marble Arch. On Sunday, following the AGM, will be the Burnby Memorial Bursary Lecture by Katey Logan, "Hearing the voices of Boots pharmacists: an investigation of identity 1930-2000" followed by Dr Axel Helmstadter speaking on "From Kew to the world: Botanical explorers' ethnopharmacological heritage".

Visit: <http://www.bsbs.org.uk/wp-content/uploads/BSHP-Conference-2017.pdf> for a programme and further details.

British Society for the History of Science Annual Conference 2017

6-9 July 2017, University of York

The 2017 BSBS conference will take place in the Ron Cooke Hub on the East Campus of the University of York, which lies at the edge of the city. It is conveniently located within walking distance of the city and is well connected to the railway station through public transport. The conference will begin with a plenary lecture by the President of the BSBS, Patricia Fara, on the evening of 6 July 2017, and continue over the next three days with parallel themed sessions and the opportunity to visit archives and historical attractions in York such as the National Railway Museum. There will be a lecture and reception in the Tempest Anderson Hall close to the location of the first ever meeting of the British Association for the Advancement of Science in 1831, and a conference dinner in the Royal York Hotel in the centre of the city. All enquiries relating to the local arrangements should be directed to bsbsyork2017@bsbs.org.uk. For further information see www.bsbsconference.org.uk

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 has been held in South America and the Southern Hemisphere. For further details, visit: <http://www.ichst2017.sbhc.org.br/>

Eleventh International Conference on the History of Chemistry

29th August – 2nd September 2017, Trondheim, Norway

In summer 2017, the fortieth anniversary of the creation of the Working Party (WP) on History of Chemistry of the European Association for Chemical and Molecular Sciences (EuCheMS) will be celebrated. The general aim of the conferences organised by the WP is to facilitate communication between historically interested chemists and historians of chemistry, and to gather the community on a regular basis. Previous conferences organised by the WP were held in Rostock 2011 (Pathways of Knowledge), Uppsala 2013 (Chemistry in Material Culture), and Aveiro 2015 (Chemical Biography in the 21st Century).

The 11th International Conference on the History of Chemistry (11th ICHC) will take place from 29 August to 2 September, 2017 in Trondheim, a city founded in 997 which served as Norway's capital during the Viking Age. The Norwegian University of Science and Technology (NTNU), which has been the country's centre for technology education since 1910, will host the conference. The conference is sponsored by NTNU, the Research Council of Norway, the Norwegian Chemical Society and the Chemical Heritage Foundation. The conference programme will include scientific sessions, key-note lectures, the WP business meeting, as well as social events such as excursions, receptions, and a banquet. The deadline for early registration will be 31 May 2017.

The key-note lectures will be given by:

Hasok Chang (University of Cambridge): "What history tells us about the nature of Chemistry".

Maria Rentetzi (National Technical University of Athens): “Revising the concept of safety culture in nuclear settings”.

Anders Lundgren (Uppsala Universitet): “Science in chemical industry – what did it do?”

For more details on the conference, including information about submitting proposals, please visit:
<http://www.ntnu.edu/11ichc>

The contact email for practical questions is: 11ICHC@videre.ntnu.no