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RSC INTEREST GROUP
HISTORICAL

Historical Group

NEWSLETTER
and
SUMMARY OF PAPERS

Editor: Dr Anna Simmons

No. 88 Summer 2025

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COMMITTEE

https://rschg.qmul.ac.uk
https://members.rsc.org/site/content/Community/InterestGroups/HistoricalGroup.aspx

RSC Historical Group Newsletter No. 88 Summer 2025

Contents

From the Editor

Welcome to the summer 2025 RSC Historical Group Newsletter. Continuing the section "Two books that markedly influenced my chemical career", in this issue Alan Dronsfield reflects on the theme of childhood engagement with chemistry by looking at James Kendall's *Young Chemists and Great Discoveries.* His second choice, the classic undergraduate textbook Albert Cotton and Geoffrey Wilkinson's, *Advanced Inorganic Chemistry,* provides an opportunity to reflect on how chemistry can be unappealing! Mike Williams then discusses Dr John Scott Haldane (1860-1936), a pioneer of the physiology of respiration and respiratory protection. Haldane was part of Oxford University's Physiology Department and this short article places him, his family and his co-workers in the context of the city and its university. His daughter, Naomi, was a good friend of the author J.R.R. Tolkien and was one of the proof-readers of *Lord of the Rings*.

Burlington House on Piccadilly is the flagship London headquarters of the Royal Society of Chemistry. Historical Group Committee Member, Anna Coyle, guided visitors around the building during Open House in September 2024. In this issue, Anna provides readers with an insight into the history of the building, its fine interiors and collections. Readers with good memories may recall how mystery chemical objects have occasionally turned up in the pages of the newsletter. Thanks to the assistance of Drew Bondy, Historical Group Chair, John Nicholson, solves a mystery from 2015! In the final short article, Tony Travis reflects on the life of Umberto Zardi and the revival of Ammonia Casale (today Casale SA.)

The summer issue begins with a tribute to Bill Brock, the distinguished historian of chemistry and lifelong member of the Royal Society of Chemistry, who passed away in February 2025. Readers will also find a fascinating report by Martin Bigg on the International Conference on the History of Chemistry, which took place in June 2025 in Valencia and summaries of the group's popular monthly online seminars. A new organiser is needed for these seminars – please see the appeal later in this issue for details. A review of Peter J.T. Morris and Peter Reed's *Henry Enfield Roscoe: The Campaigning Chemist* also appears, along with information on publications of interest and news from other history of chemistry societies.

The Historical Group's next meeting on the **History of Astrochemistry** will take place on **Thursday 16 October 2025** at Burlington House, with a mixture of talks by historians on the pre-1950 period and by astrochemists

on the more recent history of the field. A programme and booking details can be found later in the newsletter. Remember Historical Group meetings are free to attend, open to everyone and provide an opportunity to visit Burlington House.

If you would like to contribute items such as short articles, book reviews, news items and reports to subsequent issues please contact me. It's always good to hear from potential contributors and receive ideas for new content. The deadline for the winter 2026 issue will be a couple of weeks earlier than usual on **Friday 21 November 2025**. Please send your contributions to a.simmons@ucl.ac.uk as an attachment in Word. As ever, I am indebted to Gerry Moss for his assistance in pagination and production and to Alice Halman for all her help as membership secretary.

Group members should receive an e-alert from the RSC informing them when the latest newsletter is available, but for the record the Newsletter appears twice each year – usually in January and July/August. It is often available online before official notification is sent out by the RSC, so please look out for the newsletter on both the RSC and Queen Mary Historical Group websites:

https://members.rsc.org/site/content/Community/InterestGroups/HistoricalGroup.aspx (please note the change in URL) or https://rschg.qmul.ac.uk. Information on the newsletter and the Historical Group's activities is also available on the group's LinkedIn page, managed by Andrea Gallio.

Anna Simmons, UCL

ROYAL SOCIETY OF CHEMISTRY HISTORICAL GROUP NEWS

Since the winter 2025 issue was published, three new members have joined the Historical Group committee. In this section they introduce themselves to the Historical Group membership. A warm welcome to Joe, Linnea and Martin!

Joe Stanley

Originating from Ormskirk, Merseyside, I first attended university at the University of Liverpool. During my studies, I thoroughly enjoyed sitting in the library during the dark rainy evenings, reading up on the alchemical beginnings of chemistry. I am now a PhD student at the University of Warwick, working under the supervision of Professor Martin Wills. My

research focuses on the anionic synthesis of polyenes, as part of a larger Prosperity Partnership project in collaboration with The University of Nottingham and Lubrizol.

During my PhD, I have tried to get involved with as much teaching and public speaking as possible. I thoroughly enjoy using our alchemical beginnings to inspire the next generation of scientists, in the classroom and in laboratory settings. I was very pleased to be recognised for this recently, winning the Warwick Chemistry Department's "Demonstrator of the Year Award" in 2024, after being runner up in 2023. I aspire to be an inspiration to other PhD chemists, hopefully establishing myself as a Chemistry academic one day. Outside of my academic pursuits, I enjoy writing and performing my own music solo and as part of a Warwick Chemistry band "Dry Ice". I am also an avid hiker and enjoy playing football and rugby league.

Linnea Soler

My interest in the History of Chemistry is spurred on by my respect for, and natural curiosity of, the (al)chemists who managed to accomplish so much without access to our current library of understanding and technologies. I am particularly interested in those who supported their successes and how historic practices may continue to influence our practice as chemists and educators.

My chemistry career has morphed from one that is research-centred to learning, teaching and scholarship as a Senior Lecturer at the University of Glasgow. I am passionate about SoTL (the Scholarship of Teaching and Learning) and striving to enhance the student learning experience in chemistry through the development of a variety of interactive e-learning resources. I am very fortunate to be able to incorporate my interest in chemical history into developing my research and scholarship on these topics. By collaborating with a range of colleagues and working with my undergraduate students, I have explored the history of synthetic dyes as well as some conservation science aspects (pigments and polymers) with a series of student essays. With final-year project students, I created two units to teach analytical chemistry through gamification and object-based learning, both of which are grounded in the history of chemistry (1-Dyes (mauveine) and 2-Pigments (Antonine Wall sculptures). Currently, I am collaborating with Smita Odedra and with colleagues from the Hunterian Museum to explore traces of those who supported research undertaken in chemistry laboratories, but who tend to be neglected in the historical records. I am delighted to be a member of this RSC Historical Group committee.

Martin Bigg

I am a chemist and an environmentalist, championing water and environment management, sustainable development and better regulation. For several years I have been a member of the Worshipful Company of Water Conservators, a City of London Livery Company. Currently I am the Deputy Master and a Trustee of the Water Conservation Trust, running our universities programme. I believe we should be working in partnership, learning from experience, and striving for a better, more sustainable future.

I started my career with May and Baker Ltd in Norwich producing pesticides, before moving to Teesside to run plants producing pharmaceutical intermediates at Fine Organics Ltd. I am now Emeritus Professor of Environmental Technologies Innovation at the University of the West of England, Bristol. I ran an EU programme and network supporting new technologies, and undertook international projects on inspection and future environmental regulation. I have also been Chair of Council and a Board Member with the Institute of Environmental Management and Assessment (IEMA). As Chair and Board Member of the Bristol Green Capital Partnership, I helped the City of Bristol become European Green Capital 2015. For many years, I was with the Environment Agency becoming Head of Industry and Waste Environment Agency, England and Wales, regulating manufacturing, energy and waste industries, and developing policies and guidance with UK and EU governments.

Message from the Membership Secretary

If you have recently joined the group, our membership secretary, Alice Halman, sends a warm welcome. To find out more about the group, please visit our website or LinkedIn page and look at the contents of the newsletter. If you have any questions about receiving the newsletter or have ideas about improving member engagement or suggestions of topics for future meetings, please contact Alice on alicemhalman@hotmail.com.

Alice Halman

ROYAL SOCIETY OF CHEMISTRY HISTORICAL GROUP MEETINGS

History of Astrochemistry Meeting

This will be an in-person meeting at Burlington House, London, on Thursday 16 October 2025 with a mixture of talks by historians on the pre-1950 period

and by astrochemists on the more recent history of the field. The history of chemistry in space began with the development of stellar spectroscopy in the 1860s and took off a century later when organic molecules were discovered in space using radio astronomy. Astrochemists now use a combination of observation (using radio and millimetre telescopes including ALMA), theoretical chemistry and laboratory studies to build up a complete picture of how molecules are formed in space and react with each other. For further information please go to: https://www.rsc.org/events/detail/81869/history-of-astrochemistry

The event is free of charge and open to everyone. Coffee and tea will be available, but lunch is not included, although there are plenty of cafes nearby in Piccadilly and adjoining streets. Please register for this meeting by emailing the Secretary of the Historical Group, Mike Leggett, at leggett189@btinternet.com.

Programme

10.00: Coffee and tea

Session One (chair: John Nicholson)

10.20: Welcome from John Nicholson, Chair of the Historical Group

10.25: Ileana Chinnici, “Early History of Astronomical Spectroscopy”.

10.55: Helge Kragh, “Element Abundances in the Stars and Beyond, *ca*. 1925-1940”.

11.25: Simon Mitton, “Seven Steps to Element Synthesis: B2FH”.

11.55: Jonathan Hare, “Carbon Astrochemistry and the Discovery of Buckminsterfullerene”.

12.25: Lunch (not provided for audience)

Session Two (chair: Jeremy Shears)

1.45: John Black, “Alexander Dalgarno and the Growth of Astrochemistry".
2.15: Jonathan Rawlings, “First Detection of Molecules in Space”.

2.45: Glenn White, “The Development of Submillimetre Astronomy in the UK and Elsewhere”.

3.15: Tea and coffee

Session Three (chair: Peter Morris)

3.40: Mike Edmunds, "A History of the Chemical Analysis of Extragalactic Systems".

4.20: David Carty, "Laboratory Astrochemistry".

4.50: Closing remarks by Peter Morris

5.00: Meeting ends

RSCHG Meetings in 2026 and 2027

RSC Historical Group 50th Anniversary Meeting

This meeting at Burlington House on Tuesday 10 March 2026 will celebrate the fiftieth anniversary of the formation of the Historical Group (one year late!) and will be on the theme of "Fifty Years of Chemistry". The speakers are Peter Morris (history of the Historical Group), Lesley Yellowlees (women in chemistry), Gill Reid (inorganic chemistry), Jonathan Clayden (organic chemistry), Peter Atkins (physical chemistry), James Barker (analytical chemistry) and Tom Welton (Chemistry, the Environment and Sustainability). There are three past presidents of the RSC and two famous textbook authors. The meeting will appear in the RSC Events Database in due course and a programme will be included in the winter 2026 newsletter. Like all our meetings, it will be free and open to everyone.

Meeting about Chemists as Politicians

This meeting will be held at Burlington House on Friday 16 October 2026 and will be about chemists who became politicians (or at least MPs). How did their chemical training affect their outlook and conduct as politicians? Did they become mainstream politicians or were they fated to be pigeonholed as experts on science? The speakers will be a mixture of historians and active politicians. So far, the following have agreed to speak (subject to availability): Peter Reed (Lyon Playfair), Peter Morris (Henry Enfield Roscoe), Richard Toye (Stafford Cripps), Jon Agar (Margaret Thatcher), Julian Huppert and Viscount Stansgate (the RSC's former parliamentary liaison Stephen Benn).

Proposed Meeting on the History of Coordination Chemistry

It is proposed to hold a meeting in 2027 on the history of coordination chemistry, covering coordination compounds and metal chelation. Beginning

with Alfred Werner and the origins of coordination chemistry, other coordination chemistry topics could include the discovery of Zeise's salt, the anniversary of which occurs in 2027. Other subjects covered could range through metal template reactions and macrocyclic complexes, to bioinorganic chemistry, including chelation therapy, porphyrins and metalloenzymes.

Any Historical Group members who might wish to help with the organisation of this conference or suggest a specific topic for a talk, especially if they are members of other RSC Interest Groups connected with coordination chemistry, should contact Mike Leggett (leggett189@btinternet.com) and/or Andrea Gallio (andrea.gallio@bristol.ac.uk).

ROYAL SOCIETY OF CHEMISTRY HISTORICAL GROUP ONLINE LECTURES

These are continuing on the third Tuesday of each month at 2 pm (except August). Future topics include Michael Combrune and brewing, the DNA pioneer Friedrich Miescher, recreational chemistry and ether drinking. Webcams or microphones are not necessary as the audience will be asked to turn off their video and mute themselves to avoid any possible complications. Questions for the speaker should be posted via the chat function on Zoom during the meeting.

Call for New Organiser for the Online Lectures

Peter Morris has been running the online lectures since they started during the first lockdown in July 2020 and we will have our sixtieth online lecture later this year. Peter feels it is time for him to step down and let someone else take up the reins. The organiser has to find a speaker (who can be overseas) for each month (except August) to talk about a topic of interest to our members (not necessarily historical and definitely *not* an academic talk) for about 40-50 minutes. We have a rota of regular speakers but new speakers are always needed. Ideally you should have superfast broadband or at least fibre optic broadband (Peter has a copper wire connection!). Some experience of using Zoom and hosting talks is an advantage but not crucial. The organiser sets up the Zoom session using the RSC's platform (via an online questionnaire) and sends out an e-alert announcement via the RSC to publicise the talk. The organiser then hosts the talk online, introducing the speaker and fielding the questions put by the audience in chat. If you are interested, please contact Peter at doctor@peterjtmorris.plus.com to discuss this matter further. If no-one suitable comes forward, the talks will end in February 2026.

TRIBUTES

Professor William Hodson ("Bill") Brock - 15 December 1936-16 February 2025

Bill Brock was perhaps the preeminent historian of chemistry of his generation in Britain. He was a lifelong member of the Royal Society of Chemistry and a member of the Historical Group. He donated a substantial portion of his collection of books to the Royal Society of Chemistry's library in 2022. Despite having a degree in chemistry, Bill was never closely involved with the Historical Group, although he gave talks at HG meetings from time to time and was an occasional contributor to its newsletter in later years. He gave the Fourth Wheeler Lecture on 22 March 2007 with the title "Radiant Spectroscopy: The Rare Earth Crusade". He was much more closely associated with the Society for the History of Alchemy and Chemistry (SHAC). He was the Editor of *Ambix* from 1968 to 1983, Book Reviews Editor from 1985 to 1998 and Chair of SHAC from 1993 to 2006.

Brock spent his entire academic career at the University of Leicester, publishing about twenty books and more than one hundred research papers. He also wrote nearly forty entries in the *Oxford Dictionary of National Biography*, more than fifteen in the *Dictionary of Scientific Biography*, and just over twenty in Bernard V. Lightman's *Dictionary of Nineteenth-Century British Scientists*. Furthermore, he served as editor of *Ambix*, Chair of the Society for the History of Alchemy and Chemistry, President of the British Society for the History of Science, and was awarded the Dexter lifetime achievement award of the American Chemical Society.

His 1966 PhD thesis from UCL on William Prout was revised and published in 1985 as *From Protyle to Proton: William Prout and the Nature of Matter, 1785-1985*. Meanwhile he had published *The Atomic Debates* (1967), about Victorian scepticism about the existence of atoms, with David Knight and Duncan Dallas. In the history of chemical education, Bill published *H. E. Armstrong and the Teaching of Science 1880–1930* (1973) and he also had a pioneering interest in the history of periodicals. With Jack Meadows, he published *The Lamp of Learning, Two Centuries of Publishing at Taylor & Francis* (1984; 2nd ed. 1998).

It is impossible to cover all the papers Bill produced, but three stand out. His masterly (and witty) account of the history of *Chemical News* in the *Bulletin for the History of Chemistry* (1992), showed how the nature of chemical publishing changed between the 1860s and 1930s. His paper in *Ambix* (1991)

with the late Brian Gee on J.J. Griffin and the development of advanced chemistry sets did much to revive interest in the material history of chemistry. Bill's paper on Bunsen's British Students in *Ambix* (2009) vividly illustrated the influence of Bunsen on British chemistry and the varied background of his British students (and indeed the relative obscurity of many of them). The best of his papers on the history of education were collected in *Science for All. Studies in the History of Victorian Science and Education* (1996).

Bill Brock (photograph courtesy of Christoph Meinel).

His greatest achievement was his full-scale biography of the German chemist Justus von Liebig which appeared in 1997. *Justus Liebig: The Chemical Gatekeeper* was the only book-length biography of this major figure to appear in decades, and the first ever by a professional historian. This volume explored Liebig's central influence in populating European chemistry professorships, and his generational dominance in the field of organic chemistry, especially in his later pursuits of agricultural, physiological,

pharmaceutical, and food chemistry. While working on Liebig, he developed a warm relationship with Liebig's descendant, Wilhelm Lewicki. Bill was awarded the Liebig-Wöhler-Freundschafts-Preis in 1995, the Justus von Liebig Medal from the Medical Sciences Historical Society two years later and in 2000, he was awarded the Justus-Liebig-Universität-Giessen Preis für Arbeiten zur Geschichte of the Justus-Liebig-Universität-Giessen. Bill continued to revive the neglected genre of scientific biography with *William Crookes (1832-1919) and the Commercialization of Science* in 2016.

For the general reader (including chemists) he produced *The Fontana History of Chemistry* in 1992. An identical American edition was published the next year as *The Norton History of Chemistry*; in 2000 a paperback reprint was issued by Norton with a new title, *The Chemical Tree: A History of Chemistry*. It appeared in German translation in 1997, and subsequently in Spanish, Polish and Japanese editions. The book immediately became the best general account of the historical development of artisanal and scientific chemistry and its various branches and affiliations. The *Times Literary Supplement* judged it "an astonishing tour de force". He condensed this volume, duly updated, into *The History of Chemistry: A Very Short Introduction* for Oxford University Press in 2016. He also published a collection of his shorter popular pieces with the Royal Society of Chemistry in 2011 with the title *The Case of the Poisonous Socks: Tales from Chemistry*.

Brock remained an active scholar until the end of his life and his superb biography of Henry Armstrong, the eminent English chemist and ardent champion of heuristic or "self-discovery" educational methods in opposition to prevalent didacticism, was published in June 2025 by the University of Chicago Press as *Fifth Business: A Life of the Chemist and Educationist Henry Edward Armstrong*.

Born in Brighton, Sussex, Bill Brock was educated at Hove County Grammar School for Boys and took a chemistry degree at University College London in 1959. He also studied at the Guildhall School of Music and Drama and seriously considered acting as a career. He then took a masters in the history of science at the University of Leicester and joined the department there. Brock was Director of the Victorian Studies Centre at Leicester between 1974 and 1990. He retired and became an Emeritus Professor in 1998. He later held honorary positions at the University of Kent and University College London. In addition, he held several visiting fellowships at the Chemical Heritage Foundation (now the Science History Institute) in Philadelphia. Increasing ill-health forced a move to a care home in Wolverhampton in 2023, where he

passed away. The perfect gentleman, he was unfailingly kind, generous, warm, and helpful, in short, the kind of person who leaves the world a better place. The history of chemistry will be forever in his debt.

Peter Morris

An obituary of Bill written by Bill's daughter, Susannah Ahluwalia, Frank James, Alan Rocke and Anna Simmons appeared in the May 2025 issue of *Ambix* and can be accessed free at:

https://www.tandfonline.com/doi/full/10.1080/00026980.2025.2489298

THE BROCK COLLECTION

In November 2022, Bill Brock generously donated 300 books and pamphlets to the Library of the Royal Society of Chemistry from his extensive collection. The collection includes titles by Liebig from 1842, Bloxam in 1888 right up to eight volumes of the collected correspondence of John Tyndall in 2021 and covers a broad range of subjects across the chemical sciences and general science. A handful of the older books were catalogued into the Historical Collection and are viewable by request with the remainder available on the open shelves in a special area of the Library's East Gallery.

SHORT ESSAYS

Two Books that Markedly Influenced My Chemical Career

In this section we invite RSC Historical Group Newsletter readers to share their thoughts on two books that have influenced their careers in chemistry and science. Amongst the publications lined up for future issues are *Nuffield Advanced Science: Chemistry Students' Book* and Courtenay Phillips and Bob Williams' classic undergraduate textbook *Inorganic Chemistry*. If you would like to contribute, please get in touch via a.simmons@ucl.ac.uk

Two Chemistry Books that Influenced Me

I proposed to our Editor a few years ago that Historical Group members might write short articles based on the two books that had most influenced their chemical careers. At the time I envisaged that one of the books should have had a positive influence, and the other, a negative one. However, in the contributions she has so far received, authors generally chose to mention only books that they look back on with favour.

I was somewhat slow off the mark with my writing and this enabled member Nigel Jopson to write persuasively in favour of Frank Sherwood Taylor's *The*

Young Chemist [1] which would otherwise have been my first choice. Like Nigel, I found a local pharmacist whose side-line was dispensing to us enthusiasts small amounts of "chemistry-set" chemicals, usually in paper envelopes. For the substances which he associated with some danger, he would only supply to parents or guardians. And I remember he would never sell (in a single visit) potassium nitrate, flowers of sulfur and powdered charcoal….

So I have to look further for the text that most influenced me in my chemical career. I am split between two. James Kendall's *Young Chemists and Great Discoveries* [2] was first published in 1939 and, as the title suggests, presents biographical accounts of a succession of youngish chemists whose discoveries changed our world. William Henry Perkin discovered his mauve dye at the age of eighteen, only five years older than I was when I purchased the book. Later in the book we come across Charles Martin Hall who, at the age of twenty-three, discovered a process for cheaply extracting aluminium from its ores. In its 267 pages there are many other chemists making "youthful" discoveries, including Humphry Davy, Louis Pasteur, Marie Curie and Henry Moseley. The book is written in a style to appeal to young adolescents, and I suppose it started me off with my love of the history of chemistry, especially when approached with a view to the personalities involved.

There was another book, though, that influenced me almost as much as the "home practically-orientated" Sherwood Taylor one. *Chemistry Magic* [3] was an expensive American one, sadly out of reach of the family income. But the local library had a copy and was happy to let me borrow it for weeks at a time. It was a more lavish text in the style of Sherwood Taylor's, with experiments that could be conducted in a home laboratory. These were more ambitious than FST's suggestions and I suppose were attended with more danger. For example, the experiments that the author K.M. Swezey suggested using yellow phosphorus had to be conducted in my mind only – my local pharmacist would have blenched at the notion of supplying me (or my ever-obliging mother) with the free element. At the age of thirteen when I came across Swezey's text I was unaware of the *Journal of Chemical Education* and the fact that it had been given it an enticing review (see Figure 1) [4].

This book is suitable for the high-school student, the science club, or the high-school teacher looking for additional demonstrations to create interest in science. Most of the experiments are exciting, easy to follow and well illustrated…There are several experiments such as the reaction

of chromic oxide with aluminium, (or) igniting a jet of hydrogen and the preparation of phosphines that could be dangerous to an inexperienced person. The young scientist would do well to check with his (sic) teacher before performing the experiments. In any case, care must be exercised to use no more than the quantities of material called for in the experiments… The first two chapters illustrate and explain the use of basic laboratory equipment and technique used in the home laboratory.

There are nearly 200 experiments under seven general topics: Experiments with metals, Experiments with gases, Elements that are not metals, Electrochemistry and combustion, Chemistry in industry, Chemistry in the home, and Chemical sleuthing. Among the more advanced experiments, one learns how to make bakelite, synthetic rubber and rayon. The identification of uranium ore and how to make a cloud chamber are interesting experiments found in the atomic energy chapter.

I know you will enjoy doing some of the experiments, just as I have, once you start looking at the book.

Figure 1: A glowing review for Swezey's *Chemistry Magic*

I suppose I have to make a choice between my two "second-bests" for the book that most influenced my career. The Swezey text had an approach to home chemistry that was similar to Sherwood Taylor's book, so I will, for the purposes of this article, discount it. That leaves me with Kendall's *Great Discoveries*. When I first read it, I had no idea that my chemical career would take me in this direction. Arguably, I am now better known for my articles on the history of our subject than the many academic papers I've written and researched in organophosphorus and organocobalt chemistry.

I started university in 1963 and dutifully purchased the three textbooks that were alleged to support the lecture course. I had no problems with two of them: Finar's *Organic Chemistry Vol 1* [5], and Glasstone and Lewis's *Elements of Physical Chemistry* [6]. Both bore similarities to the texts I'd been using as a sixth-former. Significantly thicker, yes, and heavier, but I felt approachable. The words in each made sense, even though Finar's occasional use of strange arrows mystified me until their significance was explained as part of our introductory lecture course. Lecturers, though, seemed to pay little regard to the set texts. If you learned their notes dutifully copied off the blackboard and could reproduce them under exam conditions, success was likely. The third text I had to purchase was *Advanced Inorganic Chemistry* by

Geoffrey Wilkinson and Albert Cotton [7]. Its content bore little resemblance to Holderness's inorganic textbook I had used for my A-level syllabus. This was essentially theory-free and was almost wholly descriptive: preparations and properties, industrial processes and a "cross and dot" approach to bonding. No problem at all for those blessed with good memories. It was a continuation of a classical approach to inorganic chemistry that I suppose had as its predecessors the venerable inorganic textbooks by James Partington and Joseph Mellor.

Cotton and Wilkinson's book starts at page three. Just six pages later we encounter *The Wave Equation* and a page full of mathematics leads us to the mathematical complexity shown in Figure 2, and then on page twelve the bewildering extract in Figure 3. I had studied mathematics beyond O-level, but getting to grips with these equations and understanding their significance was worryingly beyond me.

$$\frac{\hbar}{2\pi i}\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}\right) \qquad (1\text{-}9)$$

…the Hamiltonian for the hydrogen atom in its wave mechanical form is

$$\mathcal{K}=-\frac{\hbar^2}{8\pi^2 m}\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)-\frac{e^2}{r} \qquad (1\text{-}10)$$

Now substitute this form of the Hamiltonian into the general form wave equation (eq. 1-4), we obtain

$$\mathcal{K}\psi=\left[-\frac{\hbar^2}{8\pi^2 m}\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)-\frac{e^2}{r}\right]\psi=E\psi \qquad (1\text{-}11)$$

Figure 2: Extract from page nine of Cotton and Wilkinson [8].

I looked at this chapter time and time again. I *wanted* to understand it, but I could see no "purchase point" from which to start. Later chapters seemed to be comprehensible but presumably would be predicated on the (to me incomprehensible) material in chapter one. I remember feeling perplexed and not knowing (in my first week of university) where to turn for advice. I was on the point of returning to the parental home, when I decided to grit my teeth and give the course a try. It was a good that I did. Fortunately, the inorganic chemistry lecture course was pitched at the right level and did not even touch on wave equations. True, it was more theoretical than the inorganic chemistry I had studied at school, but with a bit of study, it was digestible and I survived.

trated in Figure 1-2. When the coordinate system is thus changed, and a few algebraic manipulations performed, equation 1-11 becomes

$$\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial\psi}{\partial r}\right)+\frac{1}{r^2\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial\psi}{\partial\theta}\right)+\frac{1}{r^2\sin^2\theta}\frac{\partial^2\psi}{\partial\phi^2}+\frac{8\pi^2 m}{\mathbf{h}^2}\left(E+\frac{e^2}{r}\right)\psi=0$$

There is a whole series of functions, ψ_i, which are solutions of this equation, and we shall discuss the whole set presently. (The method of solving equation 1-14 is outlined in Appendix A-3.) Let us now consider only the one, ψ_1, which gives the lowest energy, E_1. This has a rather simple form

$$\psi_1=\frac{1}{\sqrt{\pi}}\frac{\exp(-r/a_0)}{a_0^{3/2}}$$

in which a_0 is a unit of length equal to 0.529 A., and called, for reasons we shall soon see, the Bohr radius. In Figure 1-3 is a plot of ψ_1 and ψ_1^2. It

Figure 3: Extract from page twelve of Cotton and Wilkinson [9].

Looking Back

As a lecturer in chemistry, specialising in organic chemistry, the closest I came to the type of material condensed so perplexingly in Figures 2 and 3 was when I laid the foundations for my final-year course on pericyclic chemistry. Remembering my experience with Cotton and Wilkinson, or C&W as it was generally known, I decided most firmly that my level of approach would be tailored to my students' backgrounds, especially when it came to the mathematical aspects, such as the derivation of orbital phasings.

Now when I read my copy of Cotton and Wilkinson, I am impressed by their later chapters as they try to provide explanation after explanation for the inorganic "facts" they are presenting. In this respect, they changed the face of inorganic chemistry teaching. Authors of all subsequent texts had a model to follow. Students no longer needed to have enormous memory power for internalising chemical facts. I have in mind a story concerning the great Robert Bunsen. According to Henry Roscoe, who had trained under Bunsen in Heidelberg and was a lifelong friend, "One of his assistants, engaged in the rearranging of a collection of specimens, came to him with a bottle containing quinine and wishing to find out whether 'The Chief' remembered the formula for the alkaloid, asked him for it. Bunsen, who was not to be caught out like this, replied *What do you think, Herr Docktor, is the purpose of chemical handbooks*?" [10]. Bunsen was no great theoretician, but then, he appeared to

have no great regard for the sheer memorising of chemical facts. Dare I suggest that he would have endorsed the C&W approach to his subject - that is, you ignore their introductory chapters which in September 1963 almost put me off chemistry completely. If this had happened, what would I have turned to ? A career with British Railways, perhaps, as parallel with my adolescent enthusiasm for chemistry I had a fascination with steam engines…

References and notes

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Alan Dronsfield

The Haldanes and Oxford

Last year I helped to organise the technical programme for the 21st International Conference of the International Society for Respiratory Protection, which was held in September 2024 at Pembroke College, Oxford. As part of my introduction I revisited the work of Dr John Scott Haldane (1860-1936), a pioneer of the physiology of respiration and respiratory protection. He was part of the Physiology Department of Oxford University from the late nineteenth century to the 1930s and much of his work was do carried out at or from Oxford. This piece is by no means a full biography of Haldane, but it places him, his family and his co-workers in the context of Oxford. In this piece only John Scott Haldane will be called "Haldane". Other members of the family will be given their full names.

John Scott Haldane was born in 1860 in Scotland, a member of a family that could trace its origins back to the fourteenth century. Their estate was at Cloan Castle near Aucherader but in the nineteenth century they also had a town house in fashionable Charlotte Square in Edinburgh. Haldane studied medicine at Edinburgh University in the 1880s and was probably there at the same time as Sir Arthur Conan Doyle. Professor Joseph Bell, thought to be the model for Sherlock Holmes, was a family friend.

Having completed his degree, Haldane did not take up a medical practice but started his research career at the University of Dundee, where his childhood friend and contemporary at Edinburgh Academy, D'Arcy Wentworth Thompson was the new Professor of Biology. Thompson, Haldane and the Professor of Chemistry, Thomas Carnelley studied air quality and other public health matters in the slums of Dundee, collecting air samples from the rooms of the poor where they slept at night for chemical and bacterial composition. They also took samples in Dundee sewers where one tunnel "smelled of the orange groves of Spain". This was, presumably, downstream of the Keiller marmalade factory.

Professor John Burden Sanderson, Haldane's uncle, was the Waynflete Professor of Physiology at Oxford University. Haldane joined him as a demonstrator in 1886 or 1887. At Oxford he continued his interest in respiration, helping to devise a method of determining carbon dioxide and water vapour in the air and working with Professor James Lorrain Smith of Manchester (another student of medicine at Edinburgh) on the transport of oxygen in the blood. Haldane and Lorrain Smith spent some time at Christian

Bohr's laboratory in Sweden, during which he would have met the young Niels Bohr.

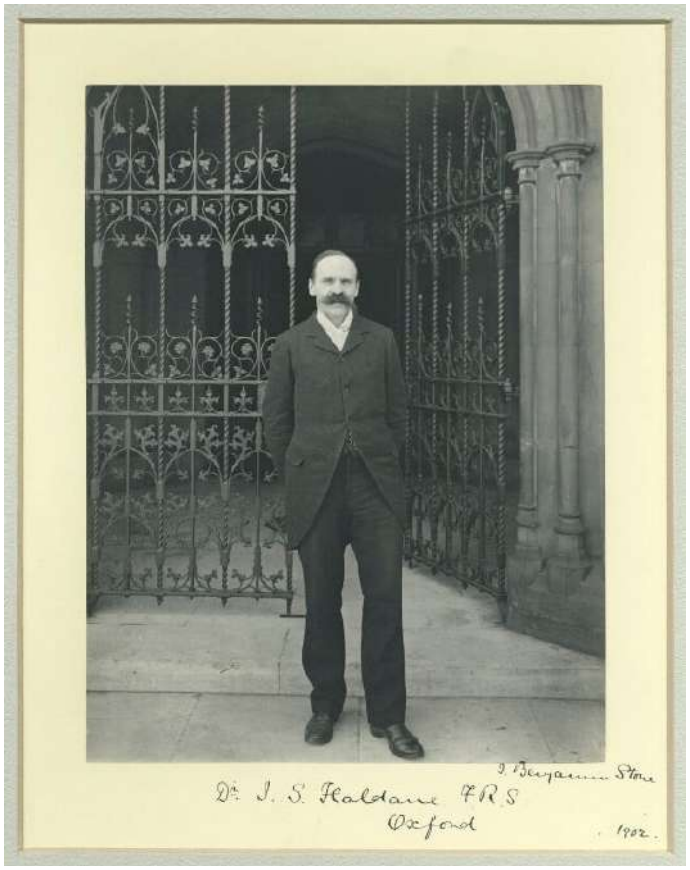

Figure 1: John Scott Haldane by Benjamin Stone (platinum print, 1902).

Credit: National Portrait Gallery, London, NPG x44709, reproduced under https://creativecommons.org/licenses/by-nc-nd/3.0/

Figure 2: Dr John Scott Haldane (on the right), with Professor Thomas Carnelley, investigating the air in a Dundee sewer, 1886 (photographer unknown). Given by the family of the late Mrs Haldane to the Scottish National Portrait Gallery, 1962.

Credit: National Galleries of Scotland, https://www.nationalgalleries.org/art-and-artists/42167

Haldane's interests were wide, from the importance of carbon dioxide in the control of respiration to the effects of carbon monoxide, especially in mines, on the human. His practice was to study the effects of this, and other poisonous gases, on himself first, observing the physiological effects set against exposure. Having developed a simple test for the amount of carbon monoxide in the blood he was able to show that the vast majority of the deaths in a particular colliery explosion were caused by carbon monoxide poisoning, not the explosion (fifty-three out of fifty-seven). He advised the use of a companion small animal for the miners that might alert them to the danger of this odourless gas. The result was the "Haldane Canary" [1].

Figure 3: Cage for reviving canary, with oxygen cylinder, made by Siebe Gorman & Co. Ltd, London.

The canary was not to be a sacrificial victim to the gas, but was to be resuscitated with oxygen and taken with the miners as they left the affected area. He advised the same tell-tale after investigating the effects of hydrogen sulphide in London sewers. He also was instrumental in

recognising silicosis in Cornish tin miners while investigating the endemic occurrence of hookworm that thrived in the warm and unsanitary conditions in the mines. With a mining engineer he worked on a water spray system to reduce the dust inhalation that led to the silicosis.

Haldane had first met his future wife, Kathleen, whilst he was a student when Kathleen and her mother had taken a rental of Charlotte Square for the summer. It was eight years before they married and eventually settled at 11 Crick Road in Oxford. By this stage Haldane was not content with his work on university premises but started doing experiments at home. When Kathleen returned to Edinburgh for the birth of their second child (it is noted that Haldane had failed midwifery during his medical degree) he decided to make two of the rooms into experimental chambers where he studied the distribution of "Town Gas" in enclosed spaces by sealing up as many openings as he could. This was to provide evidence against the introduction of "Water Gas" in the UK – which contained more carbon monoxide than "Town Gas". He conducted the experiments himself inside the rooms with a

simple hydrogen flame detection system to show when the amounts of carbon monoxide were becoming dangerous. He also made estimates of the time taken for the room to clear (about five hours on a calm day). This is roughly one air change per hour. The house was rented and (in view of the flammability of the mixture of gases being released) is still standing. There is a blue plaque on the wall. As a result of his work he was appointed to the Board of Metropolitan Gas referees.

The Haldanes moved to 4 St Margaret's Road in 1899 (a house now demolished to make way for St Hugh's College) and then to a house of their own in 1903 at the end of Linton Road (called Cherwell - now demolished to make way for Wolfson College). Here he was able to build his own laboratory with a sealable chamber where he could conduct experiments – and he didn't allow a gas connection to the house (just to the laboratory). There may have been more than one of these chambers according to a letter written by Haldane in 1915.

The year 1915 is important as it is when Haldane was drawn into the investigation of the first major use of chemical weapons in warfare. The Germans released chlorine at Ypres on 23 April 1915 as a weapon against Canadian and French troops. Haldane and Professor Herbert Brereton Baker of Imperial College went to Belgium on 26 April to collect evidence of the substance used. Haldane was fairly certain about what had happened before he left and was familiar with chlorine from work following fatalities on submarines and in a sewer downstream of bleach works. There is a typed letter in the National Archives dated 24 April 1915 from Sir John French to Lord Kitchener saying that the Germans had used "an asphyxiating gas" – probably chlorine. The typed part of the letter also refers to information from a captured German about general soldiers having pad respirators possibly containing "bicarbonate of soda" [2].

There is also a letter from Haldane in the National Archives, dated 3 May 1915, where he says that before he left for Belgium he had called Mr Winmill, the Chief Chemist at the Doncaster Coal Owner's laboratory (Haldane was Director) asking him to start experiments on respirators that would remove chlorine and bromine from inspired air [3]. He was back at his house Cherwell on the 28 May where he and his assistant Dr Anthony Mavrogordarto exposed themselves to chlorine and tested protective devices. His letter of the 3 May outlines their conclusions. He describes a 1 part in 10,000 mixture as "Quite irrespirable".

On the basis of work done by Mr Winmill and their own experiments Haldane discounted some of the cotton pad designs being promoted by Churchill as ineffective, in particular, because they allowed rebreathing of exhaled carbon dioxide. Some of the impregnants, sodium carbonate and sodium thiosulphate, were partially effective. As a field expedient he suggested breaking the lower end from a beer bottle, filling it with soil, and breathing through that, taking care to exhale through the nose. This, he claimed, was most effective, though cumbersome.

Much of the development work on respirators was done at The Royal Army Medical College, Millbank, starting on the 30 April 1915. The National Archives contain the remains of a laboratory note book, kept by Dr L.H. Parker, which is written in a very small script but appears to be contemporary [4]. It has the tell-tale stains that any laboratory chemist would find familiar. Sodium thiosulphate and sodium carbonate impregnated cloth, kept moist with glycerine, was used in the "Black Veil Respirator". Production started on 4 May and in just over two weeks all of the British Expeditionary Force had one. The laboratory book records concerns over the possible by-product of sulphur dioxide noting that Dr Baker and Dr Haldane "went alone into a room containing 1600 ppm of sulphur dioxide".

Haldane's work also involved the investigation of high and low oxygen concentrations. He spent fifty-six hours in the sealed chamber while oxygen levels fell to 10% as he breathed (with his exhaled carbon dioxide being removed by adsorbents) to mimic a crowded submarine.

Haldane also worked on breathing at depth and at altitude. These were, for obvious reasons, not possible in Oxford. The altitude experiments were conducted on Pike's Peak (USA) and the diving experiments in the Clyde. John Burden Sanderson Haldane (JBS), Haldane's son, was involved in the diving experiments. He too was to become a famous scientist, in the field of genetics. At the age of fourteen JBS participated was one of the volunteers for staged decompression experiments, in spite of never having dived before. JBS continued his interest in diving safety later in life, although it may have affected his health. A photograph exists of father and son at their home Cherwell with Australian physiologist Harold Whitridge Davies in front of the test chamber [5].

Another Oxford Haldane of note was Naomi, John and Kathleen's daughter. Naomi and her brother JBS conducted genetic breeding experiments with a few of their father's guinea pigs while both were still at school (Naomi at the

Dragon School where she was the only girl – and JBS at Eton). Soon there were many guinea pigs and a new genetic principle was discovered, leading to a joint paper. Naomi married Dick Mitchison (later a Labour MP and Peer) and under her married name published nearly one hundred books and proof-read Lord of the Rings. One of Naomi's jobs at home was to sit outside her father's test chamber and be ready to rescue him should the need arise. Also involved in this task was Julian Huxley, brother of Aldous (who also stayed with the Haldanes).

Other prominent members of the Haldane family included Daniel Rutherford Haldane, a distinguished British physician and President of Royal College of Physicians, who was Haldane's uncle. Elizabeth Sanderson Haldane, a suffragist and the first woman Justice of the Peace in Scotland, was Haldane's sister. The politician Richard Burdon Sanderson Haldane, the first Viscount Haldane, Secretary of State for War 1905-1912 and Lord Chancellor from 1912-1915, was Haldane's brother. It was with his brother's help that Albert Einstein visited Oxford and stayed at Cherwell. Einstein gave a lecture but his audience had dwindled as he delivered his talk. Haldane was not sure if it was the complicated maths that lowered the attendance or the fact that Einstein had lectured in German. It was during this visit that Naomi's daughter is supposed to have run over Einstein's foot on her bicycle.

Mabel Purefoy FitzGerald, a physiologist who worked with Haldane, was a trusted colleague. She had been a neighbour of the Haldanes in Crick Road (living next door at number twelve with her sisters). She took measurements on carbon dioxide in alveolar air from sea level to 12,500 feet in 1911 and 1913. Her solely authored 1913 paper was the first evidence that the body is able to sense oxygen. She had been the first female student in the medical school at Oxford, but was unable to gain a degree as the university did not award medical degrees to women. After teaching at Edinburgh University (where she was also denied a degree as she was a member of staff) she returned to Oxford and 12 Crick Road in 1930. She was "rediscovered" and awarded an honorary MA by Oxford University on her one hundredth birthday in 1972. An excellent appreciation of Mabel appeared in *Chemistry World* in 2021 [6]. There are also blue plaques remembering her work in Crick Road and on the Physiology Building in Oxford.

This has been a very brief account of Haldane's work in Oxford. His attitude to respiratory research was that humans (usually himself or his family/colleagues) were the best subjects for "animal" research. This was a philosophy continued by his equally eminent son, J.B.S. Haldane. When

writing about tests on respirators in World War I JBS commented that "Trained Physiologists had to be employed". In later work on the acidity of the blood he recorded that "neither a dog nor a rabbit nor any experimental animal can tell you if he has a headache or an upset of his sensations of smell" [7].

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Mike Williams

Open House on Piccadilly

The Royal Society of Chemistry hopes to throw open the doors of the east wing of Burlington House for the curious in September again this year. The chance to view the graceful rooms that are the Society's flagship premises comes as part of London's Open House festival held annually in September. It gives members of the public a glimpse into buildings that are not usually open to the public.

In 2023 and 2024 Open House was embraced by all the other learned groups that make their home at Burlington House – the Society of Antiquaries, the Linnean Society, the Geological Society and the Royal Astronomical Society all welcomed visitors over the same weekend. Many visitors do the grand tour of the courtyard taking in each of the learned societies in turn!

A Short History

Burlington House itself was originally built in 1664 by the wealthy lawyer and poet Sir John Denham. The land had been given to him by the King for the loyalty he had shown to the Crown during the English Civil War. At the time he believed his site on the north side of a country lane called Piccadilly would remain countrified to the west and north as no one would want to build so far from the bustling City of London.

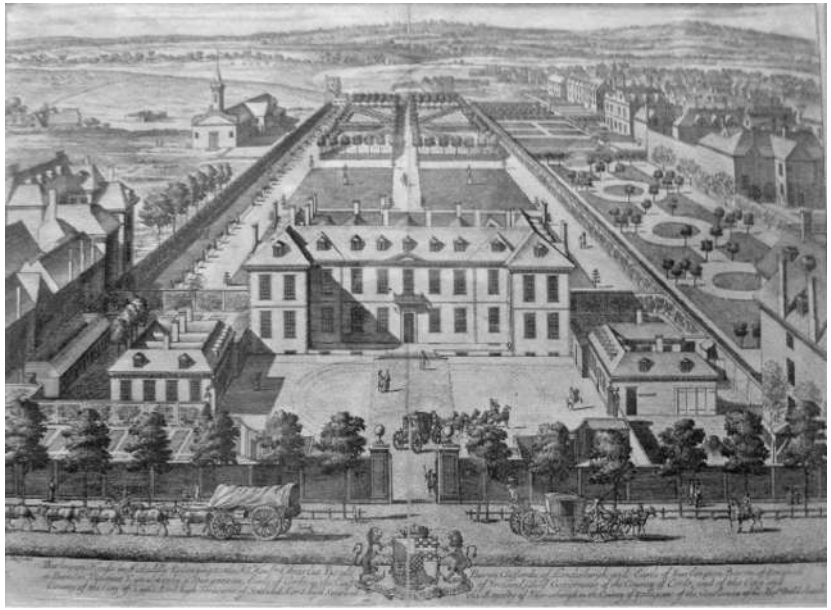
Denham built the house to welcome his new wife to his family. Margaret Brooke, a niece of the Earl of Bristol, married fifty-year-old Denham at the age of eighteen in a grand ceremony at Westminster Abbey. However the marriage was short-lived. Within months of the marriage, Margaret had become a mistress to the then Duke of York, who later became King James II. To the torment of Denham, the affair soon became public knowledge and was even recorded in Samuel Pepys's diary. When Margaret was found dead at home, poisoning was suspected and Denham was the chief suspect. The autopsy showed no evidence of poison.

The Boyle Connection

Denham sold his estate with its partly built home to Richard Boyle, the 1st Earl of Burlington in 1667. Using the services of the architect Hugh May, Boyle managed to complete the house, despite many frustrations finding

materials and workers. He was attempting to source both when London was being rebuilt after the Great Fire of London in 1666. The Burlington Estate was inherited by Richard Boyle's grandson Charles in 1698 but he only lived another seven years and was succeeded by his nine-year-old son Richard, who became the 3rd Earl. The 3rd Earl undertook major renovation work, inspired by his Italian tours, and the house became renowned as a meeting place of poets, artists and scholars of the day. On his death in 1753 the house passed to his widow and then their grandson, William Cavendish, who became the 5th Duke of Devonshire.

In 1815, the 6th Duke of Devonshire leased the house to his uncle, Lord George Cavendish, who with the architect Samuel Ware, made a number of changes over the next three years. Burlington Arcade was also built along the west side of Burlington House around this time in 1819. Henry Cavendish, the natural philosopher and discover of hydrogen, was a relative of the Devonshires and lived here in Burlington House for several years in his youth.



Burlington House from Jan Kip and Leonard Knyff's Britannia Illustrata, 1707 (Public Domain)

In 1854, the Government purchased Burlington House and its grounds for use as accommodation for "at least six of the principal learned and scientific societies who, by past usage, have acquired claims to be lodged at public expense". The Chemical Society, which had been granted its Royal Charter in 1848, moved into part of the east wing in 1857.

The Royal Society of Chemistry in Burlington House – The Tour

You enter the RSC premises on the east side of Burington House, where the hallway contains a selection of a huge number of artifacts acquired by both the Chemical Society and the Royal Institute of Chemistry. These bodies merged, along with Faraday Society and the Society for Analytical Chemistry, to form The Royal Society of Chemistry in 1981. The original hall floor was restored in 2010 as part of an extensive programme of works which included a complete overhaul of the reception and waiting areas.

The Courtyard of Burlington House and the entrance to the Royal Society of Chemistry

Fittingly, by the reception desk is a bust of Robert Boyle, the founder of modern science and author of *The Sceptical Chymist*, who laid out the founding principles of chemistry as we know it today. By complete coincidence, the bust was commissioned by the 3rd Earl of Burlington, to commemorate his great Uncle Robert, the younger brother of the 1st Earl. The bust was commissioned from the Italian sculptor Giovanni Battista Guelfi to display in his home. It was acquired by the RSC in 2003, because of this connection.

A bust of Robert Boyle can be seen in Reception. Stuart Luke Gatherer's painting Hope: The Chemist can be seen in the ground floor waiting area.

The waiting area is dominated by a large modern oil painting "Hope: The Chemist" by Scottish artist Stuart Luke Gatherer, which was purchased by the Society from the Albemarle Gallery in 2008.The picture is part of a series by the artist illustrating the seven sins and seven virtues using modern professions. The work is based on a 1768 classic painting by Joseph Wright titled "An Experiment on a Bird in the Air Pump", which in turn was inspired by Robert Boyle's experiments on the properties of air. Wright's original is in the National Galley.

As you climb the stairs ahead on the mezzanine level is a memorial plaque, known as the Pro Patria memorial, that honours the thirty members of the Chemical Society who died on active service during the First World War. It also recognises the efforts of Chemical Society member Lieutenant Colonel Edward Harrison for the part he played in the development of the gas mask.

Abstract Turn

On either side of the landing on the mezzanine are two stunning stained glass windows designed by Lawrence Lee, famous for making the stained glass windows of Coventry Cathedral. The windows are a memorial to Cyril Hinshelwood, a President of the Chemical Society and Nobel Prize winner for work on reaction mechanisms with Nikolay Semenov.

Lawrence Lee's stained glass windows, representing alchemy and chemistry, sit either side of the The Pro Patria memorial that honours the members of the Chemical Society who sacrificed their lives in the First World War

The designs on the windows are abstract representations of alchemy and chemistry and both show representations of the traditional four elements: fire is red; air is transparent, earth is green and water is blue. The lower landing window is more free form with a spiral at its centre, representing life processes in action. The upper landing window is more ordered and represents a sort of ideal towards which the processes depicted in the lower window will eventually become. They were created using the Dalle de Verre technique: Lee used leftover scraps of glass and the non-uniform pieces of glass were inlaid in an epoxy resin for stability – the "boiled sweet" texture can be seen up close.

The windows were installed in 1968, as part of a refurbishment when the Society took over the part of Burlington House previously occupied by The Royal Society, before the latter moved to Carlton House Terrace. In 1970 Burlington House was listed as a Grade II Building, so Lee's windows would not have been regarded as a sympathetic development!

The First Floor

The long corridor on the first-floor landing has an impressive array of busts featuring some of the great heroes of the chemical world: John Dalton, Sir

Humphry Davy and his assistant Michael Faraday, Sir William Perkin, known for his serendipitous discovery of mauveine, and the educational reformer and MP, Sir Henry Roscoe. Off the corridor are rooms familiar to many members through committee meetings, conferences and other gatherings.

The Priestley Room celebrates the great eighteenth-century polymath Joseph Priestley, best known for the discovery of oxygen, which he called dephlogisticated air. He was also a philosopher and theologian. Between 1772 and 1790, he published a six-volume work on his experiments with air *Experiments and Observations on Different Kinds of Air*, as well as numerous articles in the Royal Society's *Philosophical Transactions* describing his experiments in great detail, including focussing the sun on a sample of mercuric oxide so it decomposed to produce oxygen.

Priestley went on to isolate several other gases including carbon monoxide, ammonia, sulphur dioxide, hydrogen sulphide and nitrous oxide (laughing gas), which was later used as the first anaesthesia but we now know is also a powerful greenhouse gas. In 1772 he was awarded the Royal Society's prestigious Copley Medal for his work. Eventually his Unitarian beliefs meant he fled to Pennsylvania USA in 1793, where he died in 1804.



Left: The Priestley Room ready for a committee meeting. Middle: The room contains the air pump used by Priestley in his demonstrations and lectures. Right: The replica statue of Priestley by sculptor Francis John Williamson.

The room contains a statue of Priestley that is a replica of one made by British portrait sculptor Francis John Williamson. The original full-size statue is in Chamberlain Square in Birmingham. This replica was presented to the Institute of Chemistry in 1920 by Mrs Bedford McNeill, whose husband was a Priestley Scholar and a Member of Council. An air pump used by Priestley in his many lectures and demonstrations, made by Samuel Harrison, is also on display.



Left: The busts on the first-floor landing. Middle: The Hinshelwood Room on the first floor. Right: Christine Payne's representation of the thought experiment of Schrödinger's cat.

The Hinshelwood Room, named after the Nobel Laureate, contains many volumes of the Society's Historical collection. These include early copies of the world's first and longest-running scientific journal, *Philosophical Transactions*, which was launched in March 1665 by Henry Oldenburg, Secretary of the Royal Society. In one corner a small oil painting, 20 x 24 cm, can been seen. It is a representation of the thought experiment Schrödinger's cat and was originally part of a series of nine paintings by a modern artist Christine Payne. Two of them were shown in an exhibition "Seeing Red" at the Science Museum from November 2001 to October 2002. One was purchased by the RSC the other by the Science Museum.


Two views of the Council Room. On the left the two Jasperware plaques can be seen on either side of the double doors to the Hinshelwood Room. The right, looking towards the library, shows the room ready for a function.

The Council Room is where the significant formal meetings of the Society take place. The Council is the Governing Body of the Royal Society of Chemistry and its members are the trustees of the charity. The bookcase holds a collection from the home of Sir Humphry and Lady Davy, which was bequeathed to the Royal Institute of Chemistry in 1919 by former member

George Holloway. It includes publications from such notable chemists as William Ramsay, Antoine Lavoisier, John Dalton, Justus von Liebig, Lyon Playfair and William Nicholson, as well as Davy himself.

Most notable of the oil paintings in the room is perhaps of Michael Faraday's Royal Institution Christmas Lecture before the Prince Consort, painted by Scottish artist Alexander Blaikley in 1855, which was purchased by the Faraday Society in 1949. Joseph Priestley and Robert Boyle are again featured by way of two Wedgwood Jasperware oval portrait plaques either side of the double doors opening into the Hinshelwood Room.

The Library is by far the biggest and most magnificent of the Royal Society of Chemistry's Rooms. It contains about 30,000 books and over 2,000 journal titles, current and past. The library originally took up residence in the east wing in 1873 but moved to this space after a refurbishment in 1967, when the Royal Society moved to Carlton House Terrace. The current space you see today is the result of further refurbishment works in 2008 which restored the building's Victorian splendour in line with its status as a Grade II listed building.

The blue and grey colour scheme was based on an analysis of the original nineteenth century scheme, and a specially designed carpet was commissioned. To make access to the collection in the upper level easier, a bridge was built to link the east and west galleries and the original spiral staircase was relocated.

Left: A 1955 picture of the library the Chemical Society shared with the Geological Society before it moved into the East wing after the departure of The Royal Society. Centre: The Library after its 2008 refurbishment. Right: As part of the refurbishment a bridge to link the East and West galleries was built

Today the library is a modern working space, with air conditioning, audio-visual equipment for the many lectures and presentations that are hosted here, as well as a comfortable environment for members carrying out research.

At the time of publishing the Royal Society of Chemistry was unable to confirm its participation in the 2025 Open House Event but is hopeful it will be able to do so. Details will be communicated as soon as they are known. Assuming it does go ahead, it is likely to follow the successful format of previous years. The ground floor area will be open to all and access to the mezzanine and first floor will be as part of a guided tour which will be bookable in advance or on the day.

The photographs of the RSC's headquarters at Burlington House, its interiors and contents are kindly provided by the Royal Society of Chemistry Library and the article author, Anna Coyle.

Anna Coyle

Mystery Object Identified – At Last !

Just over ten years ago, I was contacted by an RSC member, asking if anyone could identify a mystery object (see the picture below). It appeared to be made of bronze, was very heavy (2lb 10 oz) and marked on the base "ICI tested". I duly published the query plus picture in the *RSC Historical Group Newsletter*, No. 67, p. 4, Winter 2015.

At the time, the best guess was that the object was probably a laboratory container for something rare, dangerous and/or expensive. Certainly, when it was encountered a decade or so ago, the container still had a small amount of liquid in it and this was released as a gas by depressing a valve under the screw cap. Despite all this detail, and the wide circulation of the *Newsletter*,

no reply was forthcoming and no further information was obtained. Until now. At the beginning of June this year (2025) out of the blue I had e-mail correspondence from Drew Bondy suggesting that it was a fuel bottle that had contained butane. Such bottles were used interchangeably for portable cooking stoves and blowlamps, and manufactured in the period 1940-1960, possibly longer. A typical stove was the Dexagas stove, pictured below with an example of our bottle to the front left. This bottle was made from steel.

Bottles for this purpose were made in a variety of designs, two of which are also shown in the second picture. These bottles were refillable, being taken back to the shop and exchanged for a full one. Refilling was then done at the shop.

The design of our bottle had the advantage that it would stand up by itself, unlike the spherical "bomb" designs also shown. For many years, these bottles were manufactured at the Wee-Dex Works in Twickenham by Dex Industries Ltd and marketed under the name "Dexagas". In the early 1950s, Calor Gas Co Ltd acquired Dex Industries and changed the name of the product to CalorDex. They continued manufacture until the late 1960s.

So, at last, we have the answer. This container was not for laboratory use at all, nor for an exotic or dangerous substance. Its purpose was much more mundane, as a storage vessel for butane.

I am very grateful to Drew Bondy for sharing this information with me, and for clearing up a mystery that I had forgotten all about.

John Nicholson

Umberto Zardi and the Revival of Ammonia Casale (today Casale SA.)

In 2018 I received a phone call from Umberto Zardi, president of the chemical engineering firm Casale SA, based in Lugano, Switzerland. Mr Zardi asked me to write an academic history of the company, whose origins go back to 1921 with the foundation by Italian chemist Luigi Casale of Ammonia Casale SA (from 2014 rebranded as Casale SA). This study, intended to mark the one hundredth anniversary of the company, provided an opportunity to explore the little-known background of a firm that through its strategy of licensing technology and the supply of machinery suited to high-pressure, catalytic processes launched the international synthetic ammonia industry (BASF at the time did not license its Haber-Bosch process) [1, 2].

With the enthusiastic help of chemical engineer Luca Bianchi, a long-time employee of Casale, it became possible to put together a fairly complete history of the first decade of Ammonia Casale. Then COVID intervened. As with so many other projects, the research was put on hold. However, Casale SA subsequently kindly allowed me to integrate the early part of the story, until around 1930, into a monograph on the international synthetic ammonia industry [3]. In this I was assisted by Lorenzo Francisci, a leading historian of the nitrogen industry in Italy [4].

Umberto Zardi passed away on 17 March 2025. It is thus fitting to place on record a tribute to his transformation of a moribund Ammonia Casale into one of today's leaders in ammonia and related technologies. Zardi's involvement began in the late 1970s, at a time when Ammonia Casale had become a shadow of its former self in part because of the technologies and the scales of ammonia plants introduced since the mid-1960s by multinational engineering contractors. They had developed the technologies more suited to the needs of the time. In 1977, Ammonia Casale and its research and development unit were acquired by the plant engineering company INGECO (INGEgneria e COnstruzioni) [5, 6]. One year later, Zardi was appointed managing director of Ammonia Casale.

Zardi decided that the solution for recovery did not need to involve large development budgets. His adaptive response came from an understanding of the various difficulties associated with inefficient ammonia converters (reactors), and how to overcome them. This led to a new design concept offering a more cost-effective production of ammonia. It would enable Casale to restore the foundations of the pioneering company that five decades earlier had been the most influential force in the growth of the international synthetic ammonia business.

Umberto Zardi was born in Bologna in 1929. After graduating in mechanical engineering from the city's university in 1954, he joined Montecatini's Inorganic Projects Division, based in Milan. For a decade he worked in research and technology development, eventually taking responsibility for the engineering and marketing of urea technology; urea is an important fertilizer made from ammonia. During 1964-1978, Zardi was with another major Italian chemical corporation, Snamprogetti, where as leader of the Inorganic Engineering Division he developed innovations in the synthesis of ammonia, and designed a new total recycle stripping technology for the urea process. He contributed to the construction of about twenty industrial plants. Snamprogetti became one of the largest licensors of urea processes in the world. With the engineer Giorgio Pagani, Zardi developed an integrated ammonia-urea process that brought about savings in energy and plant costs. This enabled a greater output of urea, at a lower cost, which further encouraged its application as a fertilizer.

In 1978, Zardi, as an experienced and talented engineer and manager, was charged with reviving the ailing Casale firm. In an almost singular first response within the ammonia industry he planned a strategic overhaul based on the redesign of ammonia converters and their revamping in order to confront the major shortcoming of existing converters, their inefficiencies. At this time, it was apparent that increasing energy, equipment and production costs were presenting new challenges to the global ammonia industry. Replacement converters, in particular, were expensive. Zardi's radical solution was to extend the lifetime of older plants through revamping (retrofitting) based on conceptual features that made the converters more efficient, with enhanced yields and reduced energy costs. It was to achieve this that Zardi redesigned the internals of the converter, which until then was almost exclusively of the axial flow type. It was an ambitious initiative.

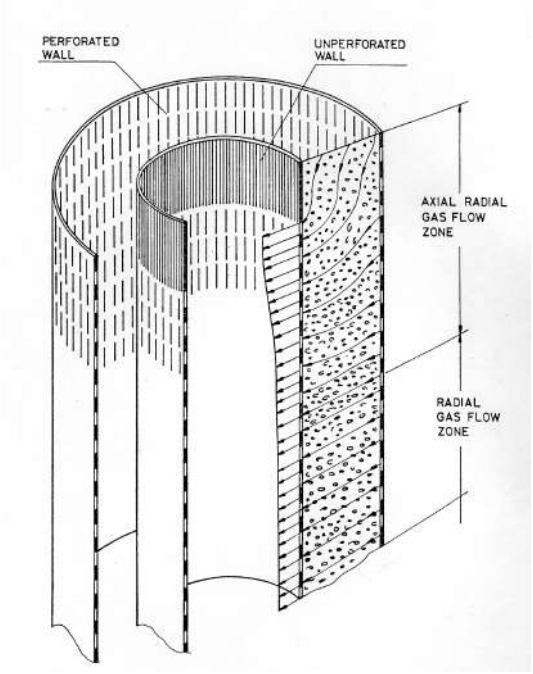


Fig. 1: 1980 diagram indicating the axial-radial flow of the nitrogen-hydrogen gas mixture through the catalyst bed, held within a catalyst basket, as used in the Ammonia Casale ammonia converter. The unperforated upper zone of the wall of the inner cylinder directs the gas flow in a predominantly axial direction through the catalyst bed. The external cylindrical wall of the basket has gauged perforations, with a net of appropriate mesh size between the wall and the catalyst bed. (Casale SA)

On the basis of extensive performance calculations, and following the work of the Danish contractor Haldor Topsøe with radial flow of gas through catalyst beds, Zardi and colleagues devised a new type of converter that combined both axial- and radial-flow operation in the catalyst bed. By 1979, the design of the axial-radial ammonia converter was complete. The new arrangement of converter internals promised to improve the performance of the synthesis loop. The proprietary axial-radial configuration, which reduces the pressure drop, was promoted in the technical media in 1980 as part of a

package for the revamping of existing ammonia converters. In December 1980, the design, applicable to modern ammonia synthesis conditions, was described at the Fertilizer Association of India's seminar on fertilizers, held in New Delhi (Figure 1). In January 1981, the design was showcased by Zardi and colleagues at the British Sulphur Corporation's fourth "Fertilizer Nitrogen" conference, held in London [7]. Revamping based on Zardi's concept was promoted as a viable and economical alternative to complete plant replacement [8].

The first industrial application of what was to become Ammonia Casale's hallmark axial-radial converter was in 1982, when a new-build 400-tpd unit was ordered by Phosphoric Fertilizers Industry Ltd in Greece. In 1984, however, INGECO was facing difficulties, and divested its holding in Ammonia Casale to a group of private investors, including banks. From Lugano, Umberto Zardi led the company under new ownership. He planned a strategic overhaul that confronted the economic shortcomings of the existing ammonia industry not only through revamping, but, moreover, *irrespective* of the converter type originally worked (of which there were several). The internals were carefully tailored to suit all existing converters. Giorgio Pagani, Zardi's colleague at Snamprogetti, moved to Ammonia Casale and developed methods for the *in situ retrofitting* of converters. The commercial breakthrough occurred with the upgrading in 1986 of four M.W. Kellogg high-capacity (1000-tons per day) ammonia units in the United States. The revamped converters worked as well as, and sometimes even better than, expected. The axial-radial flow design, and especially the in situ revamping concept, became best-sellers. This set the stage for the revival of Casale as a global leader.

Casale soon moved over to complete plant revamping, including the reformers used in the production of hydrogen, mainly from natural gas, and the nitrogen-hydrogen mixture. The firm offered customers a backup service throughout the lifetimes of plants that it designed or revamped.

In 1987, Casale made an early entry into the Chinese market. As elsewhere, the key to success, besides the good performance of Casale-designed equipment, lay in the ability to smoothly cooperate with local contractors. Casale committed to using locally produced ammonia synthesis catalysts, something that no other foreign licensor dared to do. One outcome was that Casale, jointly with the German firm Süd-Chemie (now Clariant of Switzerland), developed a highly active variant of a Chinese invention, a

wüstite ($Fe_{1-x}O$) catalyst, called Amo-Max®, for which the two firms jointly received the 2021 Sandmeyer Award of the Swiss Chemical Society.

From the late 1980s, Ammonia Casale expanded into Indonesia, Russia, India, France, the Netherlands, Germany, Japan, the UK, Brazil, and other countries. By introducing energy saving features, and novel converter designs offering even greater capacities, the firm became a leader in the technologies of nitrogen products. By April 2021, it had undertaken over 200 ammonia converter retrofits, and thirteen complete ammonia plant revamps, ranging in rated capacities from 500- to 2,000-metric tons per day. In addition, Casale licensed six new 2,050-mtpd grass-roots plants, and seventy new synthesis loops with a capacity of up to 2000-mtpd, and installed 105 new converters, ranging in capacity from 500- to 2,000-mtpd. In all, Casale ammonia technology, through revamping and completely new units, had been incorporated into more than 300 plants.

This contribution towards making nitrogen fertilisers more readily available, and production less costly, is the most outstanding feature of Umberto Zardi's legacy. According to his colleagues, Zardi was a charismatic individual with a strong entrepreneurial spirit. "The strategic expansions he guided into new markets not only diversified the business of the company but solidified the global leadership position…, yet, it was his generosity and ethical standards that truly distinguished him. His commitment to innovation and quality has set new standards in the industry, driving Casale toward a more sustainable and efficient future. He was a beacon for many, and his teachings continue to inspire Casale's corporate identity" [9].

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Anthony S. Travis

BOOK REVIEWS

Peter J.T. Morris and Peter Reed, *Henry Enfield Roscoe: The Campaigning Chemist* (Oxford: Oxford University Press, 2024). Pp. 352, illustrated. Hardback: £32.99. ISBN: 9780190844257. An OUP discount code for 30% off is available: ASPROMP8.

Henry Enfield Roscoe (1833-1916) was one of the most prominent chemists and educational reformers in Victorian Britain. A progressive Liberal, Roscoe followed in the footsteps of his grandfather William Roscoe, who campaigned for parliamentary reform and the abolition of slavery in the early nineteenth century. Serving as MP for South Manchester for ten years from 1885, Harry Roscoe (as he was known) was one of the few academic chemists to become a member of the House of Commons. Although little known today, Roscoe had a significant impact on chemistry, education and government policy, helping transform the newly founded Owens College in Manchester, where he was appointed Chair of Chemistry in 1857, into the first civic university in

England, Victoria University. As a textbook author, his educational reach extended far beyond his Manchester students. *Lessons in Elementary Chemistry*, written by Roscoe in 1866 for Macmillan’s series of school textbooks was translated into German, Greek, Russian, French, Italian, Hungarian, Japanese, Swedish, Polish and Urdu. Roscoe’s primer on chemistry, written in 1872, taught the subject through experimental work and was the most widely read of his books. The multi-volume *Treatise on Chemistry*, co-written with his colleague Carl Schorlemmer (1834-1892), was a reference book in use by chemists up to World War II.

Roscoe’s extensive efforts to improve technical education in Britain, notably through his contributions to the Royal Commission on Technical Education of 1881, were particularly significant, leading to his knighthood in 1884 and setting the scene for his election to parliament. During his tenure as an MP, Roscoe’s focus was on maintaining Britain’s position as a major trading nation by reforming science and technical education. However, as Morris and Reed underline, Roscoe provides a classic example of an individual highly successful in another field who was unable to replicate this in politics. Roscoe’s political career was affected by the Liberals being mostly out of power whilst he was an MP and he had little interest in the dominant issue of the period, Irish Home Rule.

Roscoe’s biography reads as a *Who Was Who* of Victorian science and politics. Morris and Reed have meticulously researched the multitude of students, professors, colleagues, associates, mentors, friends and family who made up Roscoe’s networks. Roscoe was related by marriage to the writer and illustrator, Beatrix Potter (1866-1943), and assisted her in submitting a mycology paper to the Linnean Society of London in 1897, as women were not able to attend meetings or read papers. Roscoe was particularly influential as an institution builder. He was instrumental in setting up the Society of Chemical Industry in 1881 and served as its first President. He was always closely associated with the chemical industry, as a consultant whilst at Owens College, and later as a founder director of the Castner-Kellner Alkali Company, which utilised new electrolytic technology to manufacture alkalis and replace the heavily polluting Leblanc process. Roscoe helped to found the Lister Institute of Preventative Medicine in 1891, working to ensure its survival during its problematic early years. He also played a key role in moving the University of London away from being a purely examining body and served as its Vice-Chancellor. Throughout his career, Roscoe’s

indefatigable nature, organizational and administrative abilities, business acumen and ability to network across academia and industry shone through.

In bringing together a scholarly biography of Roscoe, Morris and Reed have made an impressive contribution to the history of nineteenth-century science. Roscoe published an autobiography late in life, but this was selective and not always entirely accurate, whilst Roscoe's multifaceted life has never received the analysis that it warrants. Morris and Reed skilfully discuss Roscoe's Lancastrian origins, the impact of his education under Robert Bunsen (1811–1899) at Heidelberg and his admiration of German education and science, alongside the importance of the London connections formed in his early years. Their approach enables the reader to chart how these early influences shaped Roscoe's subsequent career as a chemist, educational reformer and Liberal politician. In reflecting on the biographical approach, Morris and Reed emphasize how a subject's life and scientific work do not occur in isolation. Roscoe provides the perfect subject for embracing the wider intellectual contexts and the multiplicity of interactions which accompany a life. Roscoe is presented as a Mancunian and university builder, as a chemical educator, an industrial consultant, and progressive MP who was a tireless campaigner for access to education at all levels, adroit at networking and "the antithesis of the ivory tower chemist". The authors have ably served a wide potential readership of not only historians and chemists, but also of educationalists and those interested in Victorian politics, Manchester, its industry and its university. This is an eminently readable and insightful book which at last restores to prominence "The Campaigning Chemist".

Anna Simmons

14th INTERNATIONAL CONFERENCE ON HISTORY OF CHEMISTRY, VALENCIA, 11-14 JUNE 2025

Conference Theme: Chemistry and Capitalism

One of the lessons from history is that we do not learn the lessons from history

Summary

At this biennial conference one hundred and fifteen participants, including ninety-seven contributors from twenty-five countries, of whom nine were from the UK, and a third on reduced fees, shared knowledge and experience

of the history of chemistry from around the fifteenth century to the present through visits, four plenary lectures, six parallel sessions, nine panel sessions, social activities and informal discussions. The general conference theme, Chemistry and Capitalism, was reflected in research, industry, environment, and regulations/standards from a historical perspective. It was very capably organised by the Division of History of Chemistry of the European Chemical Society and the Lopez Pinero Inter-University Institute – University of Valencia.

Programme

The programme was very diverse with many excellent presentations. Over two and a half days we learnt of links between chemistry and the public, politics, paintings, pesticides, pharmaceuticals, pyrotechnics, plastics and pollution, plus much more. Those of us with specific areas of knowledge in chemistry were taken miles outside our comfort zone.

Participants were welcomed at the Lopez Pinero Inter-University Institute where there is a display on the local history of chemistry including equipment from the past as well as micro balance scales I used at school. The lectures and hospitality were provided in the heart of the old city at the University-Business Foundation of the University of Valencia. As a result we spent some time walking the narrow streets of this impressive historic city. Mention must be made of the impressive traditional Spanish lunches in the library during the siesta at which there was much discussion and enlightenment on past and current education, research, industry and politics. I would challenge a UK university to provide such good (and healthy) fare.

It is impossible to summarise all the presentations albeit that I endeavoured to attend as many as possible. I recommend the full report when it is published. Meanwhile here are some of the themes from those I attended, based on how interesting the titles sounded.

Standards

The historic and current complexity of measurement was a feature of several presentations: grams, ounces, grains, feet, furlongs and fathoms, or even worse gallons and barrels, and describing a process or treatment by the number of drops - what concentration or volume? While the drive to define quantities nationally and internationally for chemistry and medicine has been successful, in many disciplines, particularly where there is resistance to

change, the results have been and continue to be disastrous. We need common standards to be able to trade and work together.

Regulation

Several lectures dwelt on the twentieth-century pesticides industry and the various ways in which different pesticides were perceived and regulated. We heard the contrasting histories of DDT and organophosphates, driven by commercial and national interests, resulting in the curtailment of DDT and the continuing use of organophosphates, despite their acute toxicity.

The history of the work of the UN environment programme was particularly interesting: "The UN general assembly adopted a resolution in December 1982 calling for 'full information' on any products that have been restricted in an exporting country to be made available in a language acceptable to the importing country. Only the USA voted No."

We heard of the OECD plan for the development of a "chemical passport" of toxicity information that would travel with an industrial substance across national borders, defeated by the administration of President Ronald Regan in the USA, and of the wider chemical regulatory framework particularly REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals). While the European Parliament was considering REACH, the administration of the USA President George W. Bush lobbied against the law resulting in concessions and exemptions - not the first or last time a politician has intervened, despite the science. Fortunately, the European Parliament supported REACH and it became law – "no data, no market".

Plastics

The evolution of the plastics industry from the early twentieth-century was fascinating, especially the use of milk, blood and seaweed, and the development of rubber. An early definition of plastics in the *Century Dictionary* was: "The commercial name of any class of substances, such as celluloid or viscose, which are worked into shape for use by moulding or pressing when in a plastic condition."

Of particular interest was a report from the November 1963 National Plastics Conference in Chicago, Illinois: "The future of plastics is in the trash can. It is time for the plastics industry to stop thinking about 'reuse' packages and concentrate on *single* use. For the package that is used once and thrown away, like a tin can or a paper carton, represents not a one-shot market for a few

thousand units, but an everyday recurring market measured by the *billions* of units." This report caused serious environmental damage and a failure to value a simple reusable chemical.

Public Image

A strong theme throughout the conference was the role of chemistry in society. We can recognise the first industrial revolution and the subsequent industrial revolutions from an engineering/technology and social perspective, but what about chemistry? The plenary lecture "What can chemistry tell us about capitalism, and what can capitalism tell us about chemistry?" outlined the chemistry revolution, the rise and disappearance of Kodak and I G Farben, the drivers in the industry of fashion and taste, the collaboration between and interdependency of different companies, the Second World War as a physicist's war, big science and the atom bomb - but all dependent on chemistry.

A serious challenge is the image of chemistry and the chemical industry – producers of pollution:

- Rachel Carson – Silent Spring
- Plastics – micro plastics and water bottles spread around the globe
- Vietnam war – Agent Orange
- Bhopal – Corporate crime
- Chemistry's associations with construction, mining and big agriculture

The recent revolution has been the shift from coal to oil as a fundamental feedstock - the next to plant-based materials? We hear about the green revolution, biological innovation, nature-based solutions, the benefits and costs of life saving drugs (not the chemistry behind them), not the word "Chemistry".

We heard about Chemophobia, a socially-damaging approach to the role of chemistry in society –"rationality versus concern, informedness versus gut feeling, experience versus hysteria", the need to popularise chemistry, engineering public opinion towards a favourable view of technological processes and economic benefits, rather than just making it popular. I liked this quote from a Russian paper: "A cure for this disease is total chemical literacy beginning with one's school days and the responsible handling of chemicals including their household use. The principles of green chemistry

should become a code of conduct for specialists in chemistry who have graduated from institutions of higher education." Chemistry is everywhere!

People

Many speakers gave histories of individual chemists and apothecaries but a particularly interesting presentation was on pharmacies in Paris 1700-1799 when there were over 1000 workers in pharmacies (épiciers, apothecaires). In 1776 there were 110 pharmacists in Paris, including twenty-two widows, and 128 épiciers, including twenty-eight women. There were thirty-eight boutiques per one hundred inhabitants compared with thirty pharmacies in 2024. They continue to be an essential part of the community. The history of mass spectroscopy in Austria was reflected in the very different lives of Hugo Bondy (1990-1985) and Richard Herzog (1911-1999). Despite his leading work, Bondy was expelled from university and persecuted in the Nazi era because of his religion. He then failed to be reinstated as a scientist because of his politics and his scientific contribution stopped. Herzog joined the Nazi Party and received extensive funding for his university research. He was temporarily dismissed after the war, reinstated, emigrated to the USA and continued his research.

A reminder of the unsung heroes of chemistry was given in a paper on the invisible labour in the chemistry laboratory - not the senior academics who have their name on the research paper, the international award or citation, but the staff who make the equipment, prepare the raw materials, monitor the instruments, clean up the mess. With our focus on celebrity and public profile, let us remember on whose shoulders they stand.

The Fun Bit

The conference was preceded by a guided tour of the historic centre from a chemistry and alchemy perspective. We visited the sites where alchemists tried to produce valuable products from everyday materials. We heard of Valencia's municipal chemical laboratory founded in 1881 to address public concerns on health and food safety, and the history of the chemical industry which began next to the cathedral in the centre of the old city. The conference dinner was held in the impressive surroundings of El Ateneo, a centre for culture, trade and training since 1879, the local team delivering an entertaining ABBA impression.

After the conference there was a visit to the 1962 sixty-four-metre-high Blast Furnace Number Two, part of the industrial heritage of Puerto de Sagunto. Inside it was just over 30ºC rather than the 2000ºC when operating. Nearby the late Roman streets and buildings of the Calzada Romana Via del Portica are preserved in the basement of a modern office block. It was fascinating to see the engineering - lead water pipes and a covered combined drain/sewer down the centre of the road. I wondered if their water pipes and sewers leak or overflow as much as ours! Finally we visited the 8,000 seat, first century semi-circular Roman theatre refurbished and substantially rebuilt between 1985 and 1993. After a judicial battle the Spanish Supreme Court ordered the changes to be removed, but the order was never executed. No one could agree on preserving history. It is same basic design as theatres today, with the addition of more comfortable seating.

Looking Forward

It will be the fiftieth anniversary of the EuChemS Division of History of Chemistry in 2027. The 2027 Conference will be in Bologna on 8-12 June hosted by the Societa Chimica Italiana and the Gruppo Italiano di Storia e Fondamenti della Chimica. Plans to commemorate the Working Party/Division include oral history interviews of central actors and podcasts. Plans are also being made for Division awards for the best paper. Details will be available in the HG Newsletter nearer the time.

At the Division business meeting, we heard about the plans being made for the 2029 and 2031 conferences. Sweden (Stockholm) is developing a proposal and it was also suggested that the meeting should be held in England (possibly London), as the Division has never met in the UK, and this option is being explored. Whoever hosts the future conferences, they will have to work hard to match Valencia!

Martin Bigg

REPORTS OF RSCHG WEBINARS

Pills, Potions and Poisons: Researching a Seventeenth-Century Apothecary

Helen Cooke (January 2025)

The fortuitous discovery of the probate inventory of a seventeenth-century apothecary in Nantwich led to a research project to investigate the contents of his shop, exploring on the way how efficacious, or otherwise, the items he stocked might have been. In the course of the research, insights were obtained

into the apothecary's interesting family and the times in which he lived and worked, building a picture of his business, life, surroundings and some of the ailments he may have had to treat. The research provided an opportunity for the local museum to host some engaging chemistry demonstrations making use of chemicals available to the apothecary, some of which are featured in the talk.

Three Important Collections of Chemicals at the Science Museum, London

Peter Morris (February 2025)

After a brief overview of the chemicals held by the Science Museum, this talk focussed on three important collections, namely the mauve samples of William Henry Perkin, the collection of elements assembled by Prince Louis Lucien Bonaparte, and the collection of compounds produced in the electric arc prepared by Henri Moissan. In each case, the means by which the specific collection was obtained and the samples in the collection, including their storage, conservation and display, were discussed. The talk concluded with a discussion of the value of such collections.

The History of the RSC Historical Group

Peter Morris (March 2025)

Largely thanks to the efforts of Stephen Mason, of King's College London, the Historical Group (which was then the Historical Chemistry Group of the Chemical Society) was set up in 1975. Colin Russell became the chair two years later. This period saw the increasing involvement of the Historical Group with the Annual Chemical Congress and the BOC Priestley Conference. The newsletter first appeared in 1981 and adopted its now standard A5 format in issue number four. Alec Campbell and John Shorter were the chairs in the 1980s and Noel Coley was the chair for much of the 1990s. When the Annual Chemical Congress came to an end, the HG adopted the format of two meetings a year at Burlington House. Jack Betteridge became the chair in 1999 and was instrumental in setting up the two Anglo-Dutch meetings in 2004 and 2006. Alan Dronsfield followed in 2005 and John Hudson in 2014. This period saw a collaboration with various organisations including the Society for the History of Alchemy and Chemistry and the Historical Group of the Institute of Physics. Soon after Peter Morris became the chair in 2019, the country was hit by the Covid-19 outbreak and our meetings were temporarily suspended, but online lectures were introduced in

2020. John Nicholson took over as chair in 2023. The group's membership has grown over the years from 151 in 1980 to 959 in 2024.

Two Centuries of Aromatic Hydrocarbons

David E. Lewis (April 2025)

In a paper in the *Philosophical Transactions* read before the Royal Society on 16 June 1825, Michael Faraday (1791-1867) announced the discovery of a new hydrocarbon that he called "bicarburet of hydrogen", which we now know as benzene. Faraday's achievement was reassessed in 1968 by the analytical chemist and pioneer of capillary chromatography, Rudolf Ernst Kaiser (1930-2021). Kaiser reported that the mixture that Faraday started from had over 300 components at the 100 ppm or higher level. Faraday's hydrocarbon remains a fascinating molecule with a lack of reactivity despite a molecular formula that clearly defines it as being highly unsaturated. The concept of aromaticity and methods for assessing it have remained a topic of interest for chemists and physicists alike. Faraday's discovery and its legacy were discussed in the talk.

Dying for Work: Dangerous Trades for Women (1880s-1960s)

Geoff Rayner-Canham (May 2025)

Have you heard of: the pickling girls? The match girls? The canary girls? The porridge mixers? The radium girls? The calutron girls? These were some of the dangerous trades which women had to work. These horrifying accounts were brought together for the first time in this talk. In addition, the talk introduced five of the individuals who fought for the rights and safety of these women workers and of the wider public: Alice Hamilton, Annie Besant, Grace Fryer, Joan Hinton, and Karen Silkwood.

The Shades of Industrial Hydrogen: Grey/Blue/Green

Tony Travis (June 2025)

The reactive gas hydrogen is essential to many industrial processes. Its uses include the production of fertilizers and explosives, in petroleum refineries, and in food processing. Prior to 1910, hydrogen from electrolytic processes was used mainly in the manufacture of anhydrous hydrogen chloride and in fat hardening. From 1913, it was produced from coal on a large scale and of high purity when the synthetic ammonia industry was inaugurated. From then until today hydrogen has been made, with few exceptions, from fossil fuels. In common with other fossil fuel processes, it leaves a carbon footprint, from

the carbon dioxide released to the atmosphere following the so-called shift reaction. When this happens, the hydrogen is called grey hydrogen. If the carbon dioxide is captured it is called blue hydrogen. Hydrogen made by sustainable processes, without fossil fuels, is green hydrogen and offers tremendous potential for use in pollution-free transportation systems, steel manufacture, and production of chemicals. This talk briefly discussed the history of the various processes for the production of pure hydrogen. This includes the development of technologies often driven, if not dictated, by available regional resources and feedstocks, including water power, coal, coke, naphtha, and natural gas, as well as the economic factors, and national security. Topics discussed included the production of synthesis gas (water gas, a mixture of carbon monoxide and hydrogen), cracking of hydrocarbons, steam reforming of natural gas (methane), research into catalysts, and electrolysis, its decline, and revival in the efforts to combat global warming.

RSC YouTube Channel

The recordings of a number of previous online lectures can be found at the Historical Group's playlist on the RSC YouTube Channel: https://www.youtube.com/playlist?list=PLLnAFJxOjzZu7N0f5-nVtHcLNxU2tKmpC

EVENTS, EXHIBITIONS AND OUTREACH

Communicating the Chemistry of Colour: Exhibition and Activities at Nantwich Museum

Nantwich Museum is delighted to have been awarded an Outreach grant from the RSC to develop a range of activities and events with a "Chemistry of Colour" theme. These will take place at the museum in the summer and autumn of 2025 and throughout links will be made with the local history of the area. The history of dyeing and pigments will feature in an exhibition, a trail around the museum's most colourful objects, talks, live chemistry demonstrations, and hands-on activities for children and adults of all ages.

During the school summer holidays there will be a range of family-focused workshops including tie dyeing, simple chromatography experiments, and use of natural indicators. In addition, talks and live chemistry events suitable for older children and adults will take place on 11 and 12 August, featuring exciting colourful demonstrations – one session will be entitled "Chemistry to dye for: the fascinating history of the quest for colourful chemicals", the other will discuss food colourants and their chemistry.

The exhibition, developed by members of the museum's research group (many of whom are scientists), will be displayed from 14 October – 22 November, during which period there will also be a series of talks, including "Dyeing to know: how salt brings colour to life" and "Dyeing wool and other fibres with garden and hedgerow plants".

Admission to Nantwich Museum and children's events is free; small charges will be made for talks. Check the Museum's website, Facebook, LinkedIn and Bluesky accounts for more information as our plans progress, or email helen.cooke100@gmail.com.

Helen Cooke

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.

H. Cooke and F. Parmeggiani, "Pills, Potions, and Poisons: Interdisciplinary Public Engagement Opportunities Inspired by a Seventeenth Century Apothecary", *Journal of Chemical Education*. 2025, 102, 5, 1848–1855.

https://doi.org/10.1021/acs.jchemed.4c00925

The transcript of the inventory of the contents of a seventeenth-century apothecary's shop was discovered during research for a museum exhibition on health and disease through the ages. This led to research into the remedies dispensed by the apothecary, which provided the impetus for development of public-engagement deliverables, including interdisciplinary talks, chemistry demonstrations, a searchable record of the contents of the inventory, and production of an accessible local-history booklet. The approach taken used history as a gateway to introduce chemistry and inspire people of all ages to engage with science. Detailed instructions are provided for four striking chemical demonstrations centred around apothecaries and exploiting some of the substances present in the inventory.

Alan Dronsfield and Anna Simmons, "The Centenary Series, STIs Through the Ages: NAAFI Tea and the Bromide Myth", *Sexually Transmitted Infections*, 2025; 101:71-72.

Free access at: http://sti.bmj.com/cgi/content/full/sextrans-2024-056393?ijkey=ZxWPK3ivyo6jM&keytype=ref&siteid=bmjjournals

Rumours about additives in the armed forces' cups of tea can go back over one hundred years. Depending on who is telling the story, they could have originated in the First or Second World Wars or the period 1949–1963 when young men were compelled to undertake National Service. This article, based on an earlier version published in the summer 2024 *RSCHG Newsletter*, explores the origins of the bromide myth and the use of potassium bromide in medicine.

Frank A.J.L. James, "New Sources for Reconstructing the Discovery of Potassium and Sodium: Manuscripts and Letters relating to their Electrical Detection, Isolation, Naming, Announcement, and Publication by Humphry Davy", *Ambix*, 2025, 72(1), 143-172. Free access at: https://doi.org/10.1080/00026980.2025.2480468

This paper revisits the very well-known episode of Humphry Davy's electrical detection, isolation, naming, announcement, and publication of potassium and sodium. His initial experiments were made in the basement laboratory of the Royal Institution during the autumn of 1807. This paper draws on recently digitised Davy manuscripts as well as two letters (published as an appendix) written by the medical student Henry Holland to his father at the end of November 1807 which all provide significant new insights into this episode. The letters also illustrate the sociability and clubbable mores of the scientific and medical communities. Taken together these sources tell a complex story of the issues involved surrounding Davy's results, what the nature of the new substances were and what they should be named (the evolution of their names has not been previously discussed) and, perhaps, most strikingly, how the new metals might be interpreted in terms of phlogiston theory. But beyond that, I interpret Davy's discovery of potassium and sodium as part of a long continuum of his approach to chemical and geological research and theory, rather than, as most of the historical literature portrays, an isolated but important event.

PUBLICATIONS OF INTEREST

The following journal issues have been published since the winter 2025 *Newsletter* was completed.

***Ambix*, The Journal of the Society for the History of Alchemy and Chemistry, vol. 72, issue 1, February 2025**

Special Issue - Constructing Naturalness in Industrial Settings: A Transdisciplinary Exploration, guest edited by Paulina S. Gennermann, Gina Maria Klein and Sophia Wagemann.

Paulina S. Gennermann, "A Game of Terms: Constructing Naturalness in German Flavour Regulation, 1959–2008".

Artur Neves, "Ivory Emulation: The Naturalness of Early Bioinspired Plastics".

Sophia Wagemann, "'Cycles of Clockwork Precision': Hormonal Contraception and Natural Menstruation".

Gina Maria Klein, "The Nature of Skincare: Categorising Cosmetics with Bioactive Ingredients in the Case of *Quenty-Cosmetic".*

Marabel Reismeier, "Can Chemical Substances be Natural?".

***Ambix*, The Journal of the Society for the History of Alchemy and Chemistry, vol. 72, issue 2, May 2025**

Josephine Musil-Gutsch, "Sperm Whales, Wax Sculptures, and Historical Analysis: The Role of Fat Chemistry in Authenticating Artworks in Early Twentieth-Century Germany".

Marco Bellini, "The Byzantine Alchemist Christianos and His Procedures on Indian Lac".

Frank A.J.L. James, "New Sources for Reconstructing the Discovery of Potassium and Sodium: Manuscripts and Letters relating to their Electrical Detection, Isolation, Naming, Announcement, and Publication by Humphry Davy".

Rachel Pymm, "A Consideration of John Davy's 'Analysis of the Snake-Stone'".

Susannah Ahluwalia, Frank James, Alan Rocke and Anna Simmons, "William Hodson ("Bill") Brock (15 December 1936–16 February 2025)".

***Bulletin for the History of Chemistry*, vol. 50, number 1, 2025**

William B. Jensen, "Ask the Historian: Origins of the Isoelectronic Principle".

David E. Lewis, "Poisons and Poisoning: Sergei Alekseevich Gromov (1774-1856) and the First Textbook of Forensic Medicine in Russia".

Nenad Raos, "The Making of the First Commercial Tungsten Filament Lamp".

Mario González-Jiménez, "Elmer Imes, Black History of the United States and Spectroscopy".

Gerard E. Shanley, "A Historical Case for Methyl Bromide as the Missing Anthropogenic Source in Early Twentieth Century Warming".

J.A. Linthorst, “Notes on Environmental Engagement Within the American Chemical Society, 1960-1990”.

Lumír Ondřej Hanuš, “The Whole History of the Isolation of Anandamide”.

Book Reviews•

Bernadette Bensaude-Vincent and Sacha Loeve, *Carbon: A Biography*, reviewed by Leonardo Anatrini.

David M. Behrman and Edward J. Behrman, trans. and eds., *Emil Fischer's 'From My Life*’, reviewed by Peter J. Ramberg.

Helge Kragh, *The Names of Science*, reviewed by Carmen J. Giunta.

Anthony N. Stranges, *Petroleum from Coal: A Century of Synthesis*, reviewed by Christoph Kießling.

Noah Whiteman, *Most Delicious Poison: The Story of Nature’s Toxins—From Spices to Vices*, reviewed by Mary Virginia Orna.

Letter to the Editor: Peter Morris, “New Gravestone for John Newlands Unveiled”.

The Back Story: Jeffrey I. Seeman, “The Roles and Opportunities of an Editor: Fred Greene (1927-2025)”.

Ambix Edited Collection: Commemorating the 90th Anniversary of the Society for the History of Alchemy and Chemistry

In 2025 the Society for the History of Alchemy and Chemistry will be ninety years old! The Society was first established in November 1935 by James Riddick Partington (1886-1965), Frank Sherwood Taylor (1897-1956), Douglas McKie (1896-1967), and Gerard Heym (1888-1972), and named the Society for the Study of Alchemy and Early Chemistry. Partington was its first Chairman and Sherwood Taylor was responsible for launching the Society’s journal *Ambix* in May 1937. From these early days, the Society worked on chemistry and chemical technology in antiquity and the Latin West and the development of iatrochemistry and chemical philosophy. Shortly before the outbreak of the Second World War, the Society for the History of Alchemy and Early Chemistry wound up its activities, but it was re-established in 1946, with the second volume of *Ambix* published in the same year, with articles by Dorothea Waley Singer (1882-1964) and Carl Gustav Jung (1875-1961). The Society’s early history is chronicled in William H. Brock’s article “Exploring Modern Chymistry: The First 25 Years of the Society for the Study of Alchemy and Early Modern Chemistry”. In 1975 the Society changed its name to the Society for the History of Alchemy and Chemistry (SHAC).

From when Desmond Geoghegan (1902-1973) became editor, *Ambix* began to extend its readership and its period of historical coverage to the time of John Dalton (1766-1844) and the nineteenth century. In June 1967, the first papers on nineteenth-century chemistry were published, one of which was William H. Brock’s (1936-2025) first paper in *Ambix* “The London Chemical Society 1824”. The following year Geoghegan resigned as editor and Bill, as he was always known, was parachuted into the role. As a member for fifty-eight years, fifty of which were on Council, and serving as Chair, Editor and Book Reviews Editor of *Ambix*, Bill’s inspiring leadership, wisdom and generosity guided the Society for more than half of its existence.

Various editors of *Ambix* have contributed favourite or defining papers to this collection, which showcases aspects of the breadth of scholarship supported and promoted by the Society over ninety years and is edited by Meg Piorko. Bill Brock published extensively in *Ambix* and his last paper in the journal, on the chemists Robert Warington (1807-1867) and Heinrich Will (1812-1890), jointly written with Anna Simmons, is included in this article collection. All articles in the collection are available open access during SHAC’s anniversary year.

https://www.tandfonline.com/journals/yamb20/collections/knowledge-in-the-making

Jeff Seeman, Juan Amaya, Guillermo Restrepo, “How the Nobel Committee for Chemistry Has Shaped the Nobel Prize: Historical Trends Based on the Nobel Prize Nomination Archive”, *ACS Omega* 2025, 10, 20, 20078–20094.

For those interested in the twentieth-century history of chemistry and award systems, this paper covers the historical unfolding of the Nobel Prize in Chemistry from its creation in 1901 until 1970. The paper is based on the statistical analysis of the nomination records stored in the Nobel archive. The authors found that the Nobel Committee has largely shaped the Nobel Prize. The open-access paper is found here:

https://pubs.acs.org/doi/full/10.1021/acsomega.4c08461

SOCIETY NEWS

Morris Award – Society for the History of Alchemy and Chemistry

In June 2025 the Morris Award for 2024 was presented to Carsten Reinhardt of Bielefeld University. The award lecture “Executive Science: Governmental Research in Germany, 1933-1945” took place in Valencia at the International

Conference on the History of Chemistry. Carsten was presented with the award and a framed photograph by Frank James, chair of the Society for the History of Alchemy and Chemistry. The Morris Award recognised Carsten's outstanding work as an innovator and a leader in the history of modern chemistry and chemical industry from the beginning of his career, exploring the instrumental, theoretical, commercial, industrial and regulatory dimensions of the field that we call chemistry, while emphasizing the frequent "disappearance" of "chemistry" into other fields, such as molecular biology, materials science, nanotechnology, or environmental science. The Morris Award honours the memory of John and Martha Morris, the late parents of Peter Morris, the former editor of *Ambix.*

Presentation of Morris Award 2024 to Carsten Reinhardt by Frank James. Photograph courtesy of Annette Lykknes

2025 HIST Award

The recipient of the 2025 Joseph B. Lambert HIST Award of the Division of the History of Chemistry (HIST) of the American Chemical Society is Seth C. Rasmussen for his historical scholarship and revolutionary efforts to create a vibrant worldwide community of historians of chemistry. Professor Rasmussen is a member of the faculty in the Department of Chemistry and Biochemistry at North Dakota State University, Fargo, ND. The HIST Award is for outstanding achievement in the history of chemistry and is international in scope. This award is the successor to the Dexter Award (1956-2001) and the Sydney M. Edelstein Award (2002-2009), also administered by HIST.

ROYAL SOCIETY OF CHEMISTRY HISTORICAL GROUP WEBSITE

At the time of going to press the archive of *Historical Group Newsletters* and *Occasional Papers*, edited texts of lectures on the history of chemistry by eminent historians, was not available on the RSC website. This is due to the RSC's change to a cloud-based system and is outside the Historical Group's control. The RSC is working to resolve these issues and we hope they will be sorted by the time the newsletter is published. Back issues of the *Newsletter* (from February 1996) and all Occasional Papers (from the start of the series in 1997) can also be found on the group's website hosted by Queen Mary University of London: https://rschg.qmul.ac.uk/Newsl.html

Recent issues of the newsletter can be found on the Historical Group's new RSC page:

https://members.rsc.org/site/content/Community/InterestGroups/HistoricalGroup.aspx