ROYAL SOCIETY OF CHEMISTRY

150 Years GDCh

Gesellschaft Deutscher Chemiker

# The Albert Medal

## By William Brock

The Albert Medal of the Royal Society for the Encouragement of Arts, Manufactures and Commerce was struck in 1863 to commemorate the long Presidency of the Society by Prince Albert between 1843 and his death in 1861. It was awarded annually from 1864 "for distinguished merit in promoting Arts, Manufactures, and Commerce". The medal's obverse portrays Prince Albert; the reverse three allegorical figures representing the areas promoted by the Society since its foundation in 1754. Shown here is a letter to Hofmann from the Society's President, Edward Prince of Wales (later King Edward VII), awarding him the Albert Medal for "eminent services rendered to the Industrial Arts by his investigations in organic chemistry, and for his successful labour in promoting the cultivation of chemical education and research in England." The award, therefore, reflected Hofmann's contributions to the creation of the British dyestuffs industry, and the training of chemists at the Royal College of Chemistry between 1845 and 1865. The medal had previously been presented to Justus von Liebig in 1869 for his "contributions to the development of food economy and agriculture". The only other German chemist ever to have received the medal was Robert Bunsen in 1898.



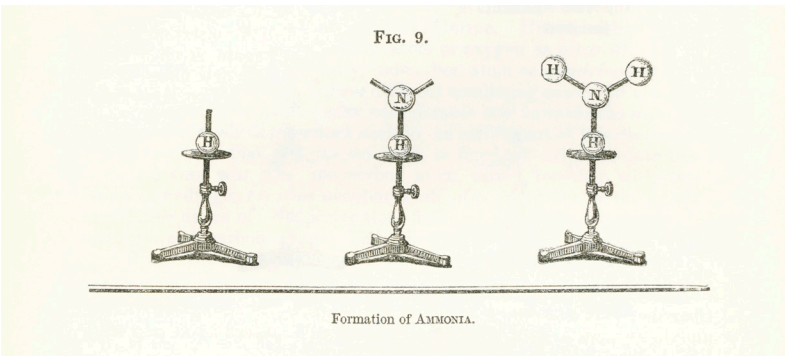
Obverse and reverse of the Albert Medal

Image reproduced by courtesy of the RSA, London. Photography by Maxwell Hodgetts

# Hofmann and chemical models

## By William Brock

In his 1862 RI lecture Hofmann had introduced wires shaped into a cube into which different coloured zinc cubes representing hydrogen, carbon, nitrogen, chlorine, etc. could be placed and substituted. This was purely an architectural visual aid to help understand substitution and how chemists could build larger molecules from the basic types of hydrogen, water, methane and ammonia. It was never meant to represent chemical reality. It was about this time that, exploiting the new concept of valence, the Scots chemist Alexander Crum Brown introduced graphic formulae. Hofmann immediately saw that these line formulae could be built in three dimensions by bolting the coloured zinc cubes he had hitherto used together and assembling them on a tripod. For ease of manipulation ceramic balls instead of zinc cubes were used. Again, these models were not in any way representative of real chemical structures, but instead visual aids of how chemists had the ability to assemble complex molecules by means of substitution and elimination reactions. With the aid of his Royal College of Chemistry (RCC) assistant, Herbert McLeod, he assembled models using miniature billiard or croquet balls, using the same coloured signatures he had used previously. These "croquet" models, which you see here, were first demonstrated in another public lecture to the RI in 1865.




A diagram on the formation of ammonia from Hofmann's Friday Evening Discourse write up "On the Combining Power of Atoms", 7 April 1865

Image reproduced by courtesy of the Royal Institution of Great Britain

Although Hofmann appears not to have viewed his models as literal images of molecules, historians have noted that he inherited an interest in architecture from his father (who designed the enlargement of Liebig's laboratories at Giessen in 1839). It has also been noted that the adult game of croquet, which was first introduced to England in 1856, quickly led to table croquet sets that young children could play with in middle-class homes. Such sets used ceramic balls. Hofmann would undoubtedly have been familiar with these cultural and recreational developments, though whether they directly influenced his modelling of molecules in the 1860s has yet to be convincingly demonstrated.

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# Hofmann's Friday evening discourse at the Royal Institution on 11 April 1862

By William Brock

In his penetrating report on the chemical exhibits at the 1862 London International Exhibition at South Kensington, Hofmann foresaw that coal was destined to be the primary source of colours and that synthetic dyestuffs would soon entirely replace natural dyes. This was the theme of a remarkable illustrated lecture that Hofmann gave to members of the Royal Institution on Friday 11 April 1862 when he was President of the Chemical Society.

Arguing that coal was "a sort of magazine of several elements", he claimed these elements could be shuffled into four "types of construction" or templates, namely hydrogen, water, ammonia and methane. He proceeded to illustrate this "type theory" with wire cubes into which blocks of zinc, each painted in colours representing hydrogen (white), carbon (black), oxygen (red), nitrogen (blue), chlorine (green), etc, could be lowered. He later called the volume of space his lattice wire cubes occupied a "crith", which went on to become the chemists' "mole".

In a further dazzling sequence of aids and practical demonstrations, Hofmann showed the audience samples of the aniline dyes that he and his pupils had prepared. These samples accompanied the printed version of the lecture in the RI's Proceedings, shown here. The lecture ended with the moral: when Faraday had first prepared benzene at the RI in 1825, he had never intended to find something "useful". Chemists should be free to pursue pure synthetic research for its own sake and allow economic and commercial applications to emerge in the course of time. Privately, however, Hofmann's own experience with his pupils demonstrated that progress would be even more rapid when there was a symbiosis between pure science and trade – a view that he did much to encourage on his return to Germany in 1865.

"Let him indulge in the pursuit of truth, – of truth pure and simple. – of truth not for the sake of Mauve, not for the sake of Magenta – let him pursue truth for the sake of truth!"

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# John Tyndall and Robert Bunsen

## By Roland Jackson

John Tyndall is known as a physicist rather than a chemist, but he had greater regard for no other German man than Robert Bunsen.

In October 1848, Tyndall travelled to Marburg with Edward Frankland. Following an invitation from Bunsen to Frankland, they had decided to study for their PhDs at the university where Bunsen was a professor. They were the first from Britain to do so.

Tyndall found Bunsen's lectures superb. He thought the teaching impressive, and that it would take 'years of devoted effort to bring England up to the same standard'. His surprisingly neat notebooks from those days have recently been discovered, and are shown here. These are predominantly in German, including substantial portions in Kurrentschrift, the old German form of handwriting.

Tyndall would later become known as one of the most engaging lecturers in England, and he was both inspired and influenced by Bunsen. When Tyndall finally got his big break—the offer of a professorship at the Royal Institution—it was to Bunsen that he turned for advice. Tyndall had to give four lectures 'On Air and Water' to qualify him formally for consideration. He wrote to Bunsen, who suggested the complete structure and experimental options for a lecture on water. Following this, Tyndall gave his second Friday Evening Discourse, the set-piece lecture to the RI's Society audience, 'On some of the eruptive phenomena of Iceland'. Again, he received advice from Bunsen, who had visited Iceland.

Over subsequent years the two men maintained a friendly correspondence. Tyndall was an important conduit between the German men of science and the British; he had many German papers translated and made available in English, and actively promoted their recognition by the Royal Society. He proposed Bunsen for the Copley Medal in 1857, and Bunsen received the award in 1860.

John Tyndall "had greater regard for no other German man than Robert Bunsen"

Image reproduced by courtesy of the Royal Institution of Great Britain

Robert Bunsen's lectures were "superb"

Image reproduced by courtesy of the Royal Institution of Great Britain

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# Robert Warington, Justus von Liebig and the Chemical Society

## By Anna Simmons

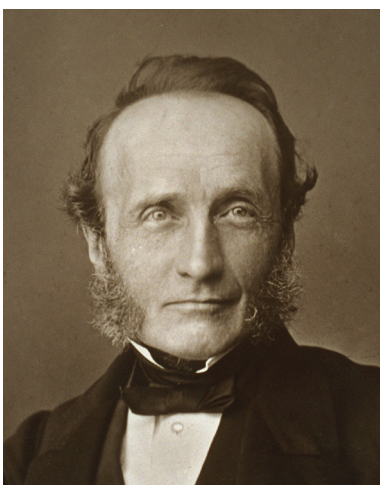
On 30 March 1841 the Chemical Society of London was constituted with seventy-seven founder members. Robert Warington was one of its two secretaries and Justus von Liebig its first foreign member.

The first edition of *Proceedings of the Chemical Society of London* contained an abstract of Liebig's paper "On the Preparation and Formation of Yellow Prussiate of Potash", which had been read at the Society's meeting on 13 April 1841, while the first edition of *Memoirs of the Chemical Society of London* contained his article "On the Preparation of Cyanide of Potassium and on its Applications", which had been read at the Society's meeting on 1 March 1842. Both articles are shown here, along with correspondence between the two men.

Warington wrote to Liebig on 4 June 1841 informing him of his appointment as a foreign member of the Chemical Society. Liebig replied thanking the Society for conferring this distinction upon him and wishing it every success. Further letters from Liebig demonstrate the close friendship which developed between the two men, a relationship which was typical of the strong links existing between German and British chemists at this time.

The central role German chemists played in shaping chemical research and education in Britain was exemplified in the Royal College of Chemistry, founded in 1845, and another institution with which Warington was involved. Liebig firmly supported the project, writing that he believed "its foundation will be followed by a new era in Chemistry in England". By this point Liebig and Warington had developed a close friendship, with Liebig sending Warington "a dozen bottles of genuine Rhein wine" and writing:

> "Regarding myself I like London perhaps more than any other place, I have in this town so many friends among whom, my dear Warington you are one of those I most esteem..."



Robert Warington was the driving force behind the formation of the Chemical Society


Justus von Liebig was the first foreign member of the Chemical Society and published in the first edition of its Proceedings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# Michael Faraday and German-speaking chemists

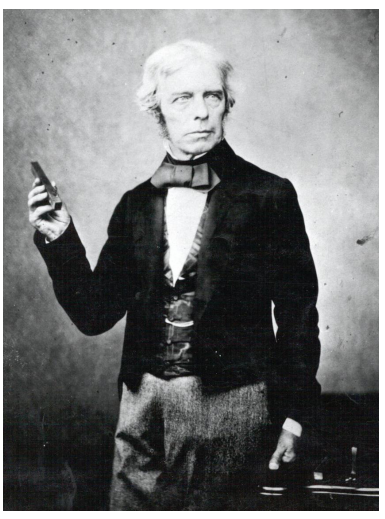
## By Frank James

By the time of Faraday's death in 1867, the centre of excellence in chemistry had shifted to the German-speaking lands. While Faraday was fluent in French, he never mastered German. While he did try, unsuccessfully, to learn the language, he increasingly came to regret being unable to read the ever increasing number of fundamental papers written in German.

Somewhat surprisingly one German chemist whom Faraday did not know particularly well was Robert Bunsen, However, one of Bunsen's students, Henry Roscoe, came to know Faraday reasonably well and indeed presented Faraday with a portrait of Bunsen. Working with Gustav Kirchhoff, Bunsen invented the spectroscopic method of chemical analysis. This work enjoyed spectacular success during the first half of the 1860s; for instance, August Hofmann, German-born professor at the Royal College of Chemistry on Oxford Street, lectured on the subject to various members of the Anglo-German royal family, including Queen Victoria.

Despite Faraday's inability to understand German, he nevertheless ascertained, through the agency of others, much of what was happening in German chemistry and in science more generally. To a large extent this can be attributed to his status as one of Europe's foremost natural philosophers and chemists of the day; it was worth the effort of keeping in contact with him. Such admiration was perhaps most succinctly summed up by Hofmann in his 1875 Faraday lecture to the Chemical Society, quoting the great organic chemist Liebig:

> // I have heard mathematical physicists deplore that Faraday's records of his labours were difficult to read and understand, that they often resembled rather abstracts from a diary. But the fault was their's, not Faraday's. To physicists, who have approached physics by the road of chemistry, Faraday's memoirs sound like an admirably beautiful music.//



Michael Faraday "continually regret[ted] not being able to understand German"
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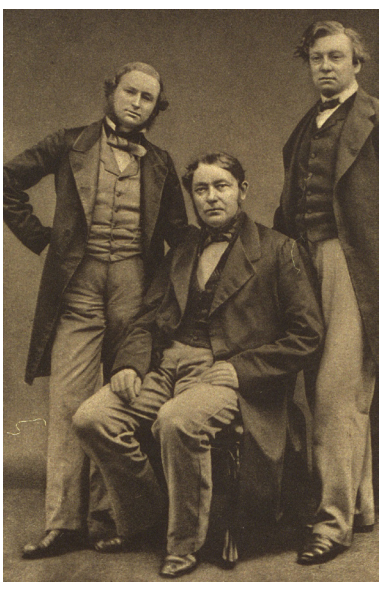

Robert Bunsen, Gustav Kirchhoff and Henry Roscoe
© Royal Society of Chemistry

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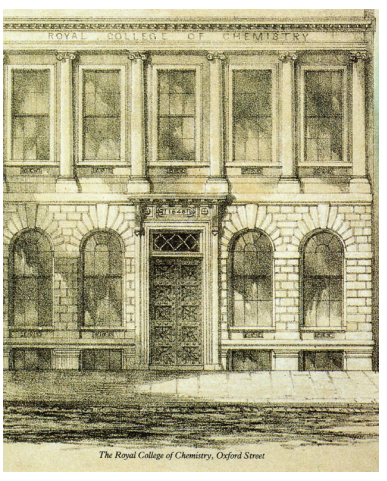
# The Royal College of Chemistry – a Chemical Landmark

## With thanks to William Griffith

The Royal Society of Chemistry's Chemical Landmarks Scheme is an initiative recognising sites connected to a chemical discovery or development that have made a significant contribution to health, wealth, or quality of life. The distinctive blue plaques are publicly visible, giving passers-by an insight into chemistry's relevance to everyday lives.

This blue plaque, commissioned and rededicated to celebrate the 150th anniversary of the Gesellschaft Deutscher Chemiker, will replace an older plaque currently mounted on Oxford Street in London to mark the former site of the Royal College of Chemistry. August von Hofmann was its first director, President of the Chemical Society of London from 1861 to 1863, and after his return to Berlin founding President of the Deutsche Chemische Gesellschaft in 1867.

The foundation stone of 299 Oxford Street was laid by Prince Albert on 16 June 1846 and the building completed in May 1847, having cost some £5,000. The Royal College of Chemistry was the first constituent college of Imperial College London and eventually became the Imperial College Chemistry Department.




The former site of the Royal College of Chemistry on Oxford Street

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