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THE FOUNDATION OF IUPAC (1919)*

Established by the International Research Council (IRC) in Brussels on 28 July 1919, the International Union of Pure and Applied Chemistry (IUPAC) was among the first of the Council's international unions. IUPAC emerged from two competing projects: one for a successor to the pre-war International Association of Chemical Societies (IACS), the other responding to specifically post-war ideals, including an alliance between science and industry under the auspices of two national societies of chemical industry. The statutes drafted in Paris in April 1919 were discussed through to the Brussels IRC conference, where they were definitively approved on 24 July.

Introduction

The IUPAC centenary (1919-2019) has been the occasion for a number of recent historical studies. My own contribution, published in the 2019 Conference Proceedings of GNSFC meeting (Gruppo Nazionale di Fondamenti e Storia della Chimica), focuses on the foundation of the Union and is more fully referenced than is possible here. Readers seeking a more detailed account may wish to consult this GNSFC publication [1].

International meetings before 1914

During the second half of the 19th century, the growth in the number of universal exhibitions was accompanied by a parallel growth in scientific congresses, many of them in chemistry. A congress with particularly important consequences for future developments was the one that Belgian chemists organized in Brussels in 1894. Devoted to applied chemistry, this was the first of a series of international congresses that continued to be held until the eve of the war, the eighth of them taking place in Washington in 1912 [2]. Given their applied focus, the congresses left little room for fundamental, or «pure», chemistry, and it was this that led to the founding of an International Association of Chemical Societies (IACS) in Paris in 1911. The IACS was the initiative of the three leading European chemical societies of the day: the Société Chimique de France (SCF), the London's Chemical Society (CS), and the Deutsche Chemische Gesellschaft (DCG). Other societies soon joined, bringing the number to fourteen, the great majority of them European, by 1914. Most of the IACS's activities concerned aspects of standardization, notably nomenclature, atomic weights, chemical formulae. The first president was Wilhelm Ostwald, followed by William Ramsay and, just before the war, Albin Haller (Fig. 1). It was Haller who in 1913 secured substantial financial backing for the IACS from Ernest Solvay, subject to Solvay's insistence that the IACS should have its administrative headquarters in Brussels in association with the new Solvay International Institute of Chemistry.

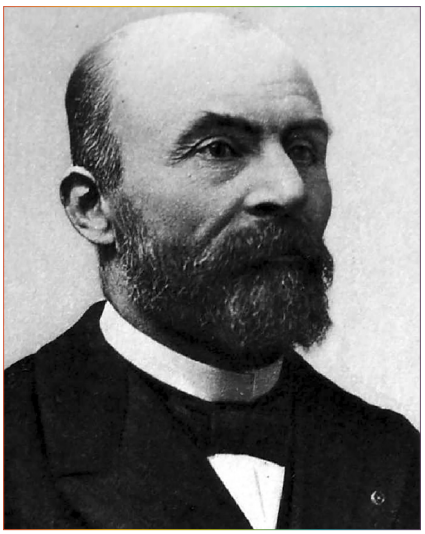

Fig. 1 - Albin Haller (1849-1925), founder then last president of the IACS (1913-1919)

*Major part of this work has been presented at the XVIII Convegno Nazionale di Storia e Fondamenti della Chimica (Rome, 2019) and will appear soon in the Proceedings of that Conference (https://www.accademiaxl.it/pubblicazioni-2/rendiconti-on-line/)

An Allied Reorganization of Science

The origins of the Allied idea of excluding Germany from international scientific organizations after the war go back to the destruction of the University of Leuven Library and the massacre of civilians, the 1914 Manifesto of the 93, and the first use of gas warfare. For several years after 1918, Allied scientists thought it was inconceivable that they should be seated at the same table as their German colleagues. This meant that the post-war reorganization of science became a crucial question. The first discussions took place through 1917 and 1918 between three leading figures: George E. Hale (National Academy of Sciences (NAS), Washington), Arthur Schuster (Royal Society, RS), and Émile Picard (Académie des sciences, ADS). In the spring of 1918, Belgium, Italy, and Japan joined the exchanges, and it was agreed that an interallied conference should be held that autumn in London. Hale submitted two printed memoranda for the London conference. The first of these was a text setting out the regulations of the USA's National Research Council (US NRC) in Washington, created in 1916 and associated with the NAS. The wartime aims of this NRC embraced pure and applied research in science, and both areas were considered relevant to peacetime as well. Hale clearly saw the NRC's regulations as a model for other countries to use in establishing their own National Research Councils (NRCs) under the overall control, as in the USA, of a national academy. The second memorandum was a *Suggestion* for the constitution of an International Organization for Science and Research that would bring together the NRCs of all countries.

On 30 September 1918, at a special meeting of the Académie des Sciences in Paris, two main resolutions were approved and sent to Schuster for the London conference: first, that the Central Powers (the Austro-Hungarian, German, and Ottoman empires, and Bulgaria) should be excluded from all international scientific organizations and secondly, that pre-war associations should be dissolved, with a view to establishing new ones open to the Allies and, in due course, to certain countries that had been neutral during the war.

The Interallied Conferences

The first Interallied Conference, in London, brought together the 33 representatives of 8 nations (Belgium, Brazil, France, Great Britain, Italy, Japan, Serbia and United States), from 9 to 11 October 1918. They discussed the American and French proposals. The resulting decisions drew heavily on the French statement, which excluded the Central Powers, and on some of Hale's proposals, notably his idea about national Research Councils.

A Committee of Enquiry was constituted to draw up a general plan for the new international bodies. It was also agreed that the next Interallied Conference would be held in Paris at the end of November. In London, however, there was no discussion of chemistry.

In Paris, from 26 to 29 November 1918, 46 delegates representing 10 nations (those attending in London plus Romania and Poland) discussed then approved a first draft of statutes of the future international organization for science and its associated associations. They also took the decisive step of transforming the Committee of Enquiry into the International Research Council (IRC). Questions of principle provoked lengthy debates. At the end of the conference, an Executive Committee (EC) was elected. It was composed of five members from the five "founder nations": É. Picard, mathematician (F, president); three vice-presidents: G.E. Hale, astronomer (US), Georges Lecointe, astronomer (B), Vito Volterra, mathematician and physicist (I); A. Schuster, physicist (GB) (secretary). Among the five, there was no chemist. The task of the EC was to centralize all proposals, so as to avoid a dispersion of resources or possible duplication of effort. At a special meeting held shortly after the closing session, the astronomers and the geodesists approved the definitive regulations for their respective unions.

It was during this second conference that a Committee for International Cooperation in Chemistry, subsequently referred to as the *Committee for Chemistry*, was set up. It was composed of the six chemists present at the conference: A. Haller (F), Percy Frankland (GB), Charles Moureu (F), Raffaelo Nasini (I), Arthur A. Noyes (USA) and Joji Sakuraï (J). As president of the Committee, Haller proposed two resolutions: 1. that the IACS should be dissolved and replaced with a new body open only to the interallied societies and, in

due course and by invitation, certain neutral nations; 2. that the pre-war funds granted by Ernest Solvay, the sponsor of the IACS, should be returned.

An alternative plan: the Societies of Chemical Industry

At the same time, a second and quite different project for chemistry was emerging. The initiative came from two national societies of industrial chemistry: the Society of Chemical Industry in Great Britain (BSCI) and France's Société de Chimie Industrielle (FSCI). Since the summer of 1918, these two societies had been laying plans for continuing in peacetime the cooperation they had begun during the war.

The BSCI, established in 1881, and the much younger FSCI, created in 1917 in Paris, were chaired by two long-standing close friends, both prominent in the chemical industry: Henry Louis, president of the BSCI, and Paul Kestner, president of the FSCI. On 4 November 1918, in London, on the occasion of a reception in honour of Kestner, they discussed a plan for an interallied federation to oversee such matters as documentation, patents, and the standardization of analytical methods, as well as urgent questions relating to a number of commercial exchanges. The idea of an interallied organization for chemistry had by now been reinforced by the decisions emerging from the interallied conference in London some weeks before.

It was decided at the BSCI meeting that France and Great Britain would each create a national group. The first to be established was the British *Federal Council for Pure and Applied Chemistry* (FCPAC), chaired by William Pope in January 1919. The *French Fédération Nationale des Associations de Chimie* (FNAC), chaired by Moureu, followed soon afterwards. Each group was composed - on an equal basis - of chemical societies and societies concerned with industrial matters.

The FNAC appointed a provisional Committee to draw up statutes for the future interallied body, and in April 1919, the FSCI decided to issue a return invitation to the BSCI. On this occasion it offered to hold an interallied conference on chemistry during the FSCI meeting in Paris. The aim was clearly to establish an interallied confederation of chemistry, in accordance with the resolutions of the Interallied Conferences of the Scientific Academies in London and Paris in 1918.

The Paris Interallied Conference for Chemistry, 14-15 April 1919

So it was that on 14-15 April 1919 the first two national groups came to be established. The American, Belgian, and Italian chemical societies sent representatives to the conference. The result was a gathering of 45 chemists from the five so-called "founder" countries (21 from France, 11 from USA (among them five were advisors at the Peace Conference), 6 each from Great Britain and Italy, and 1 from Belgium), in addition to four chemists, without voting rights (from France, USA, and Great Britain) attached to the conference. They voted to create an interallied confederation of pure and applied chemistry and approved a first draft of the statutes (Fig. 2).

The aims of the confederation were to promote better procedures for documentation, international standards governing the format of publications and abstracts, action on international patents, and analytical methods, as well as the familiar subjects of nomenclature and atomic weights. In fact, the new body essentially adopted the main objectives of the IACS, though with an extension to the industrial and commercial aspects of chemistry. Members of the Confederation's Council were to be appointed, two from each country, one for pure chemistry, one for applied or industrial chemistry. The headquarters would be in Paris, in the building that housed the FSCI. Moureu was elected as president, and the Secretary General (SG) was to be Jean Gérard, who was also SG of the French national Federation and of the French SCI.

Fig. 2 - First general assembly of the Interallied Conference for chemistry, Paris, 14 April 1919 (from *Chimie & Industrie*, 2(5), 501

In all this, what became of Haller's plan? At the Paris Conference, he failed in his hopes for a resurrection of the IACS. After this meeting, the first statutes, reworked by the French, were sent to the IRC Executive Committee for examination at its Paris meeting in May. It is important to bear in mind that there was no chemist on the IRC's Executive Committee. Yet the IRC was being asked to consider two competing chemistry-related projects. One was Haller's, based on the renewal of the IACS. The other was the work of chemists with a broader spectrum of interests embracing both pure and applied chemistry. The IRC's Executive Committee declared that it hoped that the two projects would be merged into one at a special meeting on chemistry planned for London in July, before being presented to the IRC meeting in Brussels soon afterwards.

The London Interallied Conference for Chemistry, 16-18 July 1919

Once again, the British SCI planned to hold a parallel interallied conference of chemistry during its meeting in London between 16 and 18 July. At the plenary session, the SG Jean Gérard presented a report on the April meeting, along with some additional resolutions wholly in accord with the IRC's principles. The American Edward W. Washburn had suggested that the name should be changed from *Confederation* to *Union*, but this proposal was rejected. In London, on 18 July, the International Confederation of Pure and Applied Chemistry was formally established, and a new version of the statutes approved.

The question that remained was how to incorporate the new body in the framework of the other international organizations associated with the IRC. With this project in hand, a delegation chaired by Moureu (Fig. 3) went to Brussels.

The "Birth" of IUPAC: Brussels, 18-28 July 1919

The project had first to be submitted to the IRC Committee for chemistry. On 22 July, a meeting between this Committee and the delegation from London was held in a room of the Belgian Académie des Sciences. Those present also included members of the IACS Bureau and chemists who were present in Brussels as their countries' delegates to the IRC conference.

Haller chaired the session. After briefly reviewing the history of the IACS, he presented the two resolutions on which the IACS's adhering societies had voted. Of 14 societies contacted, 11 had responded. Of these, 7 agreed to the two proposals (dissolution, followed by a new association without the Central Powers and the return of the funds to the sponsor). Since seven answers represented the majority of the votes cast, it followed that the IACS had to be dissolved, with the money going back to Solvay. The assembly endorsed the dissolution. Then, as chair of the session, Haller presented the new organisation as proposed at the Paris conference in April. It was now, as he put it, for the chemists present at the meeting to found an interallied organization consistent with the wishes of the International Committee for chemistry while also (as he hoped) taking account of the decisions taken by the chemical societies of the old IACS.

At this point, Haller declined to become president of this Confederation and yielded the floor to Moureu. While Haller invoked his age, other possible reasons are evident, probably political ones. Though Haller ('70) and Moureu ('56) were members of the interallied Committee for chemistry (two from France out of a total of six), they represented two different generations.

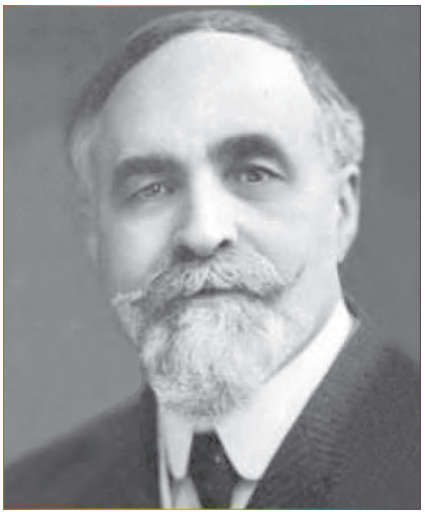

Fig. 3 - Charles Moureu (1863-1929), first president of IUPAC (1919-1922)

After a brief report on the new body, Moureu underlined the fundamental difference between the IACS and the Confederation: in the IACS, a country was represented by one or more independent societies, whereas in the Confederation, a country would be represented by a federation of all the country's national societies.

In Brussels, over three special sessions, successive versions of the statutes were discussed, and the title *Union Internationale de Chimie Pure et Appliquée* was adopted. On 24 July, the final project was presented to the IRC Executive Com-

mittee. Schuster, the IRC secretary, remarked that it would be necessary to omit the names of all the founder countries in the first article, because Japan, represented on the Committee for chemistry and now an important member of the IRC, was not among them; the list of five founders was duly removed in the definitive version. On 24 July, too, the IRC Executive Committee approved the Union's request for membership of the Council. At the closing session of the general assembly (28 July), the creation of three new international unions (astronomy, geodesy and geophysics, chemistry) was approved unanimously, and their statutes were passed unread. Some days later, writing to Solvay, Haller commented that he had worked hard to persuade colleagues to accept his proposals, but that he had failed. No funds from Solvay were ever sent to the young IUPAC.
In addition to Moureu as president and Gérard as secretary general, IUPAC's first Bureau was made up of four vice presidents: Georges Chavanne (B), W. Pope (GB), Leopoldo Parodi-Delfino (I), and Charles Parsons (USA). J. Sakurai was subsequently elected a vice-president, though not until several years later.

The Italian presence

R. Nasini attended the Paris meeting in 1918, as a member of the International Committee for Chemistry, and as a delegate in Brussels. E. Paternò attended the Paris Conference in April; arriving late, however, he was present for only part of it, and he was not in London or Brussels. The industrialist Pirelli, a delegate of the Società di Chimica Industriale di Milano, who attended the London and Brussels conferences of 1919 in place of L. Parodi-Delfino of the Società di Chimica Industriale di Torino, was a substantial presence. So too was Ostilio Severini, director of the Società Generale per la Cianamide. He attended the conferences in Paris in April and London in July and participated actively in the discussions.

Conclusions

IUPAC emerged virtually unchanged from the Confederation that had been created in April 1919 in Paris. Italy offered to host the first International Conference of Chemistry at Rome in June 1920. At that Conference (an event that should nowadays call the General Assembly), IUPAC was to confirm its more distant heritage by incorporating the programme of the IACS among its aims.
It was also in Rome that the regulations for congresses of pure and applied chemistry were approved and written into the rules of IUPAC. It was agreed that congresses would be independent but that they would take place at the same time as the IUPAC annual general assembly.

Acknowledgments

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La nascita della IUPAC

La IUPAC (Unione Internazionale di Chimica Pura ed Applicata), istituita a Bruxelles il 28 luglio 1919 per iniziativa dell'IRC (Consiglio Internazionale delle Ricerche), fu tra le prime associazioni internazionali create dal Consiglio. Prese vita da due progetti concorrenti: uno si proponeva di sostituire la IACS (Associazione Internazionale delle Società Chimiche) di origine prebellica, l'altro ispirato agli ideali specificatamente post-bellici, comprendenti un'alleanza tra scienza e industria, sotto l'egida di due società di chimica industriale. Gli statuti della IUPAC, redatti a Parigi nell'aprile 1919, furono discussi a Bruxelles e varati in maniera definitiva il 24 luglio.