IUPAC Expansion from 1957 to 1975

by Danielle Fauque and Brigitte Van Tiggelen

To chemists and chemical educators, there were two important events in the '60s and '70s. First, in 1961, the agreement between physicists and chemists on the choice of carbon 12 as unique element of reference in the atomic weights table and then in 1971, the definition of mole as the seventh unit of the international system [1]. In both of these issues the Union played its role as expert to the fullest, and established solid grounds for a common language of chemistry across the world. This role is also extended to other matters at a time marked by social changes. Technological progress improved quality of life like never before and the space conquest that opened new horizons, both scientific and technological, to explore. All the while, despite the Cold War, international and interdisciplinary projects are established, and new international organizations, such as UNESCO, appear to cope with the new challenges. Alongside these organizations, the longstanding ICSU and the Union adapt themselves.

With unprecedented demographic growth, food and public health had become challenges that were met through the development of industrial production and intensive farming, in which chemistry played a crucial role. However, this was not without any societal impact, and contributed to raise social awareness on chemistry's environmental impacts. Rachel Carson's book, *Silent Spring,* in 1962, accompanied the beginning of that movement, at the very time chemistry underwent new expansions and developed new interdisciplinary approaches.

The International Conferences of Chemistry (equivalent to nowadays General Assembly), which were privileged moments for Council, sections and commissions meetings, were in a productive rut. A report of the state of the Union was distributed in advance to all members, sharing the internal affairs of the Union. It was the opportunity to recollect deceased members, summarize the work of the executive committee based in the reports of the sections and commissions sent by their chairs, and share news on the collaboration with ICSU and UNESCO, to which the president of IUPAC would add his personal reflection on the general policy of the Union. The presidents between 1957 and 1975 were main movers in important changes, not so much in the structure of the Union than in a fresh way to relate to the non-chemical world, and the new adhering organizations [2].

The turn of the sixties: milestones in IUPAC history

Arthur Stoll (1887-1971) and William A. Noyes Jr. (1898-1980), respectively President from 1955 to 1959 and from 1959 to 1963, initiated these reforms. As early as 1957, and in the midst of his tenure, Stoll (Sandoz Ltd, Bâle) underlined two major concerns, stemming from the increasing level of activities of the members, which would later significantly impact the evolution of the Union. First, the question of financial resources needed for the Union to intensify its actions called for more support from the chemical industry. Second, there was the question of lack of diversity in the representation in the Council, the section committees, and the commissions. Western Europe and North America were indeed largely dominant, and some adhering countries didn't even have any commission representative (see fig. 1), (cb2, p.49). In 1961, Noyes also insisted on the matter in an unusually long half term report. To him, the Union was facing the following difficulties, which we will elaborate on in the next pages: (a) The rapid evolution of chemistry; (b) The increase of direct exchanges between chemists as travels become more accessible; (c) The financial state of the Union, and (d) Awareness of IUPAC and publications.

The rapid evolution of chemistry

Faced with the challenges of interdisciplinarity and the changes in the boundaries between chemical specialities, IUPAC had to adapt. For instance, a new commission was established to spread the recent advances in the use of spectroscopy in chemical analysis: The Commission on Molecular Spectroscopy, founded in 1957 following Harold Thompson's suggestion, who was to be its chairman until 1963 [3]. The aim was here again to propose relevant methods and recommend standards. Thompson (1908-1983) also chaired the independent *Triple Commission for Spectroscopy* from 1965-1967, a joint commission linked to the three international Unions (Physics, Chemistry, Astronomy) under the aegis of ICSU. (Thompson will later serve as IUPAC President in 1973-1975.) Other specific topics required new international commissions: for example, catalysis was not represented in the Union at this time. Also, IUPAC had to be devoted to applied as much as pure objects of investigation; in particular, IUPAC had to be involved in topics more relevant to the global society such as atmospheric and water pollution, water wastes, industrial toxicology, and so on. Noyes added that several organizations needed expert and objective advice and IUPAC had to fill that role, going beyond scientific

Stoll
19th ICC
XVI Congress
Paris

20th ICC
XVII Congress
Munich

1957 1959

Noyes
22nd ICC
XIX Congress
London

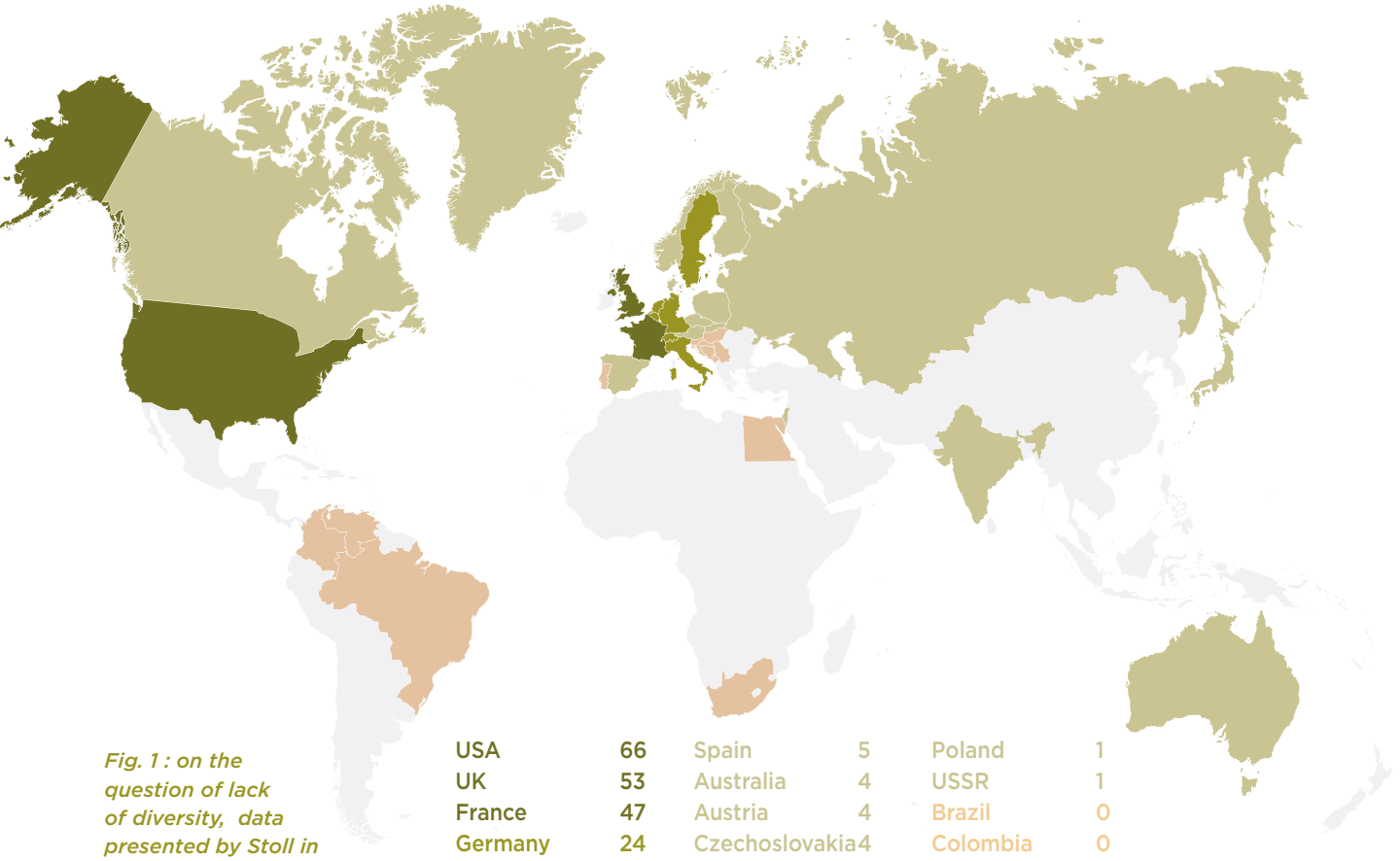
22nd ICC
XIX Congress
London
President term changes to 2 years

1961 1963

nationalism to benefit human kind: "A resurgence of scientific nationalism must not be tolerated" (cb4, p. 75). The modernization of commissions was urgent. In 1963, at the end of his term, Noyes insisted once more on the opening of IUPAC to new fields, stressing especially the duty to support ICSU's commitments and the proposal of UNESCO on science teaching.

The travel revolution and the acceleration of direct exchanges between chemists

Travelling was becoming easier and more accessible, which allowed the chemists to meet more regularly and discuss issues without waiting for the International Conferences or Congresses. For the Union, that meant a loss of control in the decision process. The travel revolution had another impact: easy travel also eased the circulation of chemists from developing countries. As mentioned earlier, both Noyes and Stoll were convinced that IUPAC had to open itself geographically. Noyes argued with data and repeatedly detailed how much IUPAC was mostly a North American and Western European organization. Office terms should also be shorter to include more diversity, and the statutes were reformed to that aim. Principally the president term was reduced to two years. Alexander R. Todd (1907-1997), who succeeded Noyes in 1963, was the first president with a two-year term, with the vice president considered president elect and the past president remaining in the Council also for two years. At the section level, a president now had to be chosen not only for his standing as a chemist but also his nationality. As a result of this policy, Victor N. Kondriatev (1902-1979), from the Soviet Academy of Science, was the first Russian president in 1967 [4]. At the time, the Bureau (1967-69), in addition to Kondratiev, was only composed of 5 non-European and non North-American members out of 23 (thus only 22 % of titular members) (cb7, p. 15). However, to avoid potential distorts,

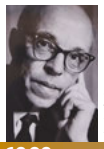


USA	66	Spain	5	Poland	1
UK	53	Australia	4	USSR	1
France	47	Austria	4	Brazil	0
Germany	24	Czechoslovakia	4	Colombia	0
Netherlands	23	Canada	3	Egypt	0
Sweden	19	Finland	3	Hungary	0
Switzerland	16	Norway	3	Portugal	0
Italy	13	India	2	South Africa	0
Belgium	11	Japan	2	Venezuela	0
Denmark	8	Israel	1	Yugoslavia	0

Fig. 1 : on the question of lack of diversity, data presented by Stoll in 1957(cb2, p.49).


Todd
23rd ICC, Paris
XX Congress, Moscow
1965


Klemm
24th ICC
XXI Congress
Prague
1967


Kondratiev
25th ICC, Cortina d'Ampezzo
XXII Congress, Sydney
1969

Kondratiev immediately underlined that the choice had to prioritize the scientific excellence, above geographic provenance.

The financial state of the Union

Up to 1955, the financial health of the Union had been excellent, allowing for a steady growth in the Union's activity and presence compared to the other Unions. In 1956 however a deficit was clearly emerging.

The recurrent financial struggles were due to the ever-increasing international involvement in scientific and technological questions. ICSU, at that time, was very committed to interdisciplinary operations, starting with the International Geographical Year (1957-1958), and continuing with the Committee on Space Research (COSPAR, established in 1958), the Special Committee on Oceanic Research (SCOR), and the Special Committee on Antarctic Research (SCAR, established in 1957). In parallel, ICSU was also collaborating with other international organizations such as FAO or ISO (particularly with the change of the international system of units from CGS to MKSA), all activities which included IUPAC. That required a reform of the statutes, which was agreed upon, to provide greater structural flexibility to the divisions (the new name of the sections), to allow them to send members in these new structures.

To solve the financial dead-end, Stoll recalled a proposal made in 1955 but not implemented: to ask for contributions from leading chemical companies. That was done in 1961. At this time, the secretary general Rudolf Morf (Switzerland) was based in Basel and benefited from the generosity of the Swiss Companies, notably of Sandoz where he worked, and later, of F. Hofmann-La Roche. Morf, an industrial engineer and secretary general since 1956, was not only honorary secretary but also executive secretary. Discussions with big chemical companies led to the creation of a new group of IUPAC adhering bodies: the *Company Associates Group* (CAG) that would have delegates at the Council without voting rights. In 1967, the CAG had 70 members.

IUPAC also benefited from advice from the Union Bank of Switzerland, which ensured a better management of the funds. During the '60s, the taxes on IUPAC funds kept in London increased significantly. On the advice of the Union Bank of Switzerland, they were sent to Zurich, where they were free of taxes. The headquarter, in Paris since the birth of IUPAC, followed, and was now located in Zurich Airport, along with the archives—In this way, IUPAC entered the Swiss legal system. The increasing activity of the Union also imposed new consideration on the secretariat work that had exceeded what the secretary general was able to handle. At last a permanent office was installed, not without difficulties, in Oxford in April 1968 (cb8, p. 13).

Spreading the word beyond the immediate circle

As Stoll stated in 1959, IUPAC was not well known beyond its immediate membership. More had to be done to raise IUPAC's profile in the wider community, as for instance growing a stronger presence through publications such as the Red Book [5]. With regard to other publications, the IUPAC journal *Pure and Applied Chemistry* (*PAC*) born in 1960 enjoyed increasing success, and a more ambitious version of the *Information Bulletin* was even suggested. This bulletin, a booklet really, was sent to Council members to inform them of decisions taken during the regular Council meetings. Raymond Delaby initiated this publication in 1948 as *Circulaire d'information*. The typescript *Bulletin d'information* managed by R. Morf turned into the *Information Bulletin* in the 1960s, underlining the role of English as the only vernacular language of IUPAC. It was presented at this time as a booklet, nicely printed by Butterworths, London, giving news on recent proposals in nomenclature to be discussed before they were published, or commissions or committees' reports, among them the Committee on Teaching Chemistry (CTC). In 1979, it became *Chemistry International*.

The '60s and '70s: Opening to the world and facing societal challenges

As stated earlier, the exponential growth of specialized fields of chemistry, often interdisciplinary, required adjustments in IUPAC's structure, and the time period 1965-1975 witnesses several modifications. Division IV (biological chemistry) disappeared in 1967, as the relationships with IUB pacified, and the corresponding nomenclature commission was moved to Division III (organic chemistry). The commission of clinical chemistry turned into a section attached to the Bureau (cb7, p. 26), before eventually becoming a division (Div. VII) in its own right in 1979. By contrast, in 1967 the commission on macromolecular chemistry rose to the level of a division: the Macromolecular Division (Div. IV) (without of the term 'chemistry'), later (in 2004) renamed the Polymer Division. A Joint commission IUB-IUPAC was linked to Divisions III (organic chemistry) and IV (macromolecular) for matters of nomenclature. The breadth of topics foreshadows other specialized commissions.

The Analytical Chemistry Division (Div. V) seems to remain unchanged through that period, but a closer

Rees
26th ICC, Washington, DC
XXIII Boston

1971

Bénard
27th ICC, Munich
XXIV Congress, Hamburg

1973

Thompson
28th ICC, Madrid
XXV Congress, Jerusalem

1975

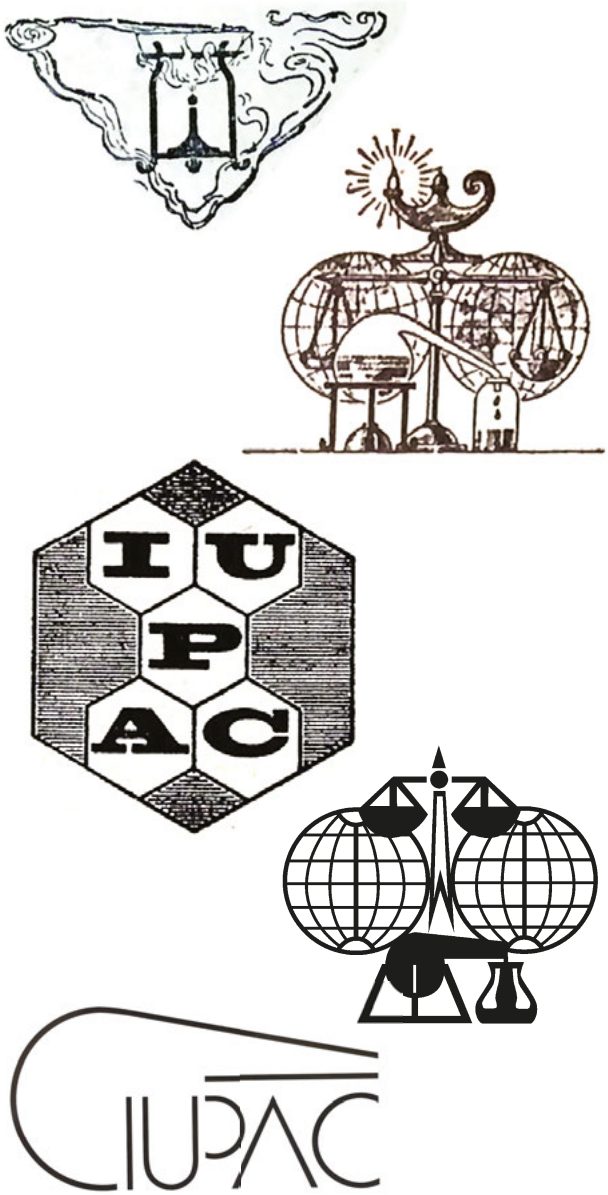
look shows that, because of the increasing sensitivity of analytical instruments, its commissions adopted more contemporary topics especially in the field of trace analysis.

The Applied Chemistry Division (Div. VI), composed of several sections, each of them with several commissions, evolved substantially, demonstrating how much more engaged IUPAC was in interdisciplinary projects related to society. One good example of this is the Commission on Pesticides. The name of this Pesticides Section, early Crop Protection Products Division (1953) linked with an international body on agronomy, was changed in 1959. From 1965 onwards, in relation with the Codex Alimentarius Commission of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) of the UN, the decision was taken to establish standardized analytical methods to measure the pesticides residues in foodstuffs. To that aim, two commissions were set up in 1967 (cb7, p. 165): Terminal Pesticides Residues and Pesticide Residue Analysis, which published long reports in the *Comptes rendus* the following years, notably in 1969 (cb8, p. 166-208). The 1975 reports of these commissions reveal the extent of the work accomplished.

In the same way, *Food Section* (VI.1) was replaced by its two commissions (Food Additives and Food Contaminants) and a Coordinating Committee in 1975 (cb11, p. 304), signalling the new perspectives and demands on food control by intergovernmental agencies. In a similar fashion, the *Water, Sewage and Industrial Wastes* commission became the *Commission on Water Quality* while a new *Commission on Air Quality* was formed. In the meantime, and under the pressure of several unions including IUPAC, ICSU creates SCOPE in 1969, one of the aims of which is the study of the social effects of man-made change in the environment. The IUPAC SCOPE Committee was linked to the IUPAC Executive Committee, and its members came from both the Analytical and Applied Chemistry Divisions. By skip stones, there was a shift in the topics discussed inside these divisions.

But three Interdivisional Committees (nomenclature, machine documentation and analytical methods) demonstrated the limits of the traditional structure of IUPAC; they were created outside of the divisional hierarchy to facilitate exchanges between their members and to avoid double studies and to represent IUPAC in other international organizations.

Even though IUPAC's structure as it stands in 1975 displays a distribution of topics and fields more in tune with the evolution of chemical sciences and technology, the structure was in fact still based on the



Puzzling logos and the story behind

In 1969, and likely to celebrate IUPAC 50th anniversary, the Union started to use the logo we are most familiar with today. Before, after, and in between, others appeared in various publications, and some are quite elusive. **Who can tell that story? If you are interested, please reach out** edit.ci@iupac.org.

Taking stock in 1973: Bénard's report on the state of the Union

In contrast with tradition, Jacques Bénard (1912-1987) addresses three major issues in his 1973 state of the Union, leaving aside all the routine questions of details. Interestingly, his approach anticipates the major organizational reform the structure of IUPAC will undergo a few years later (cb10).

The first point focuses on nomenclature. IUPAC's traditional role in nomenclature was now scattered in specialized commissions, to the point that an *Interdivisional Committee on Nomenclature and Symbols*, attached to the Executive Committee, had been created to coordinate these different commissions, on the suggestion of the CNIC in 1963. A task group was asked to investigate the possibility of regrouping all activities pertaining to nomenclature, and perhaps to symbols, in a particular division.

The second theme related to chemistry's applications. Since the merging of commissions in divisions in 1951, the place for applied chemistry was problematic, because of its swift expansion and flexible boundaries with established domains of chemistry. More crucial was the budding preoccupation of national governments with food quality, as well as the environmental and health impacts of chemistry. An interdivisional approach was necessary, and it was high time to give a statutory place to the Company Associates Group (CAG) that had played a crucial role. This CAG became the very active *International Company Associate Group* (ICAG) in 1973, and later the *Committee on Chemistry and Industry* (COCI) in 1977, definitively becoming an integral part of IUPAC structure.

ICAG promoted the interests of chemistry within civil society, and under its influence, a new Committee, *CHEMRAWN* (*Chemical Research Applied to World Needs*), totally different from the traditional commissions in its structure and working, was founded in 1975 and set directly under the Executive Committee's responsibility.

In his report, Bénard already advocated for a more flexible structure of the Union, based on operational projects with a clear delineation in terms of goals, duration and financial means. In his view only such a reform would allow the Union to follow closely and efficiently the course of development in applied chemistry.

The third point dealt with IUPAC's relations to other national and international institutions. A need for rationalization at the ICSU level was clear (SCOPE, CODATA, COSPAR, etc.). Under the aegis of UNESCO, IUPAC participated at a high level with the thriving joint actions for education: international meetings, but also publications, including the *International Newsletter on Chemical Education*. With this periodical, the Committee on Teaching Chemistry (CTC) was building on the success of the "New trends in chemistry teaching."1 Notably, the establishment of the *Associated Organizations* membership had already secured steady liaisons with learned and technical societies related to chemistry.

Bénard concluded that the structure of the Union did not suit the present circumstances of chemistry and the wealth of its applications—he went as far as saying that if IUPAC was created in 1973, it would actually be on totally different fundamentals. To him, IUPAC ought to develop a way of adapting to the conjunctures of chemistry, creating new commissions if necessary, but also being able to accept the dissolution of the oldest or inefficient ones to leave the way to new commissions, otherwise the actions of the Union would soon become fruitless.

1 E. Cartmell (ed.), *New trends in chemistry teaching / Tendances nouvelles de l'enseignement de la chimie*, vol. 1 (1964-1965) (UNESCO, 1967, 2nd ed. 1968), Foreword by R.S. Nyholm, chairman, CTC-IUPAC; Vol. II

principles of 1950. And as chemistry deployed in all its components and pervaded all aspects of life and society, the pace of IUPAC's structural adjustments proved too slow. It would be necessary to wait until the '90s to make a radical transformation of the Union.

References:

1. R. Marquardt. The mole and IUPAC: a brief history, infra p. 50
2. The IUPAC presidents between 1957 and 1975 were: Arthur Stoll (1955-1959), William A. Noyes Jr. (1959-1963), Alexander R. Todd (1963-1965), Wilhelm Klemm (1965-1967), Victor N. Kondratiev (1967-1969), A. Lloyd G. Rees (1969-1971), Jacques Bénard (1971-1973), and Harold W. Thompson (1973-1975).
3. C. Reinhardt. IUPAC: Engaged in the Instrumental Revolution, infra p. 35
4. E. Zaitseva-Baum**.** The First Russian President of IUPAC: Victor Kondratiev (1902-1979), infra, p. 33
5. G.J. Leigh. A History of the IUPAC Commission for the Nomenclature of Inorganic Chemistry (CNIC), infra p. 39

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