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The “Happy Thirties?”

Millikan’s Troubled Presidency of IUPAP

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Tuesday, September 14, 1946. Amsterdam. At a conference on the Zeeman effect, a number of physicists from around the world took part in an informal evening gathering to discuss the future of the International Union of Physics. Major changes in international institutions were expected to materialize early the following year, after World War II had put an end to many interwar collaboration bodies. “It seemed that in several Unions the international cooperation was very good, ..., but in the Physical Union it has always been very weak,” said the British astronomer, professor Frederik J. N. Stratton (1881–1960), acting as General Secretary of the Council for Scientific Unions.¹ The conversation was a *déjà vu* from twenty-seven years earlier, after the Great War, when astronomy was praised for a long tradition of useful international collaboration, enabling them to create a working international union, while the physicists were slow in so doing and, as seen in the earlier chapter, unable to give it any major content in its first decade of existence. Also, in 1933, after a watered-down physics conference in Chicago, which had initially been planned as a major event to consolidate the International Union of Pure and Applied Physics (IUPAP), there was a general feeling that “the Union might disintegrate if it did not hold a meeting which would demonstrate that it had both vitality and a real work to perform.”²

Indeed, in the 1920s, under the Presidency of William H. Bragg (1862–1942), the International Union of Physics was left in hibernation waiting for the time when Germany would be able to enroll as a member.³ In 1931, with the transformation of the International Research Council (IRC) into the International Council of Scientific Unions (ICSU), it seemed that the time was ripe for an active and truly international union of physics. The energy, ideas, and experience in science policy of the new President, the American physicist Robert A. Millikan (1868–1953), promised to be the final trigger for IUPAP to become a functioning body of physicists. But the thirties, which Hans A. Bethe (1906–2005) called in retrospect “the happy thirties” due to the

¹ A. Establier to J. Needham, October 1, 1946, folder D/XI/14, 5, Archives of the International Institute of Intellectual Cooperation (IICI), available at <https://digital.archives.unesco.org/en/collection/iici-documents/>.

² R. A. Millikan to H. Abraham, August 4, 1933, roll 12, 666, Papers of Robert Andrew Millikan, microfilm edn (hereafter RAM), Caltech Archives and Special Collection Repository, California Institute of Technology.

³ See chapter by Fauque and Fox in this volume.

immense activity and transformations in both theoretical and experimental physics,⁴ turned out to be not as happy for the Union as some hoped at the beginning of the decade.

The previously mentioned meeting in 1946 also regretted that “the archives [of the Union] were lost during the war,” and that is why it is so difficult to trace the inner activity of IUPAP in the interwar years. Yet, “everyone present insisted on the necessity of bringing the union to a new life and investigating the causes of its failure in the past,” among which two seemed obvious to them: the “absence of a definite scientific program” and the appointment of “great names” in the board rather than “people that have enough time and organizing qualities to be able to do all the work that should be done.”⁵ The first, as shall be seen, was very much the case. The latter, however, seems unfair to, at least, two people who did spend much time and effort trying to promote the Union: Millikan and, especially, Henri A. Abraham (1868–1943) who was the General Secretary from its inception and until his assassination in Auschwitz.

In this chapter, and taking as our main sources the Millikan archives and the correspondence of Abraham scattered in other repositories, including the archives of IUPAP, we shall try to reconstruct the plans, successes, and failures of the Union in the 1930s. These include Millikan’s attempt to use his presidency as one more element in his pursuit to promote the place of American science in the international stage with a major (failed) conference in Chicago, the work of the two commissions created in 1931, the hopes and disappointments with the German question, and the convoluted succession in the presidency of IUPAP after 1934.

Robert A. Millikan, President of IUPAP (1931–1934/7)

Science in general, and physics in particular, saw a radical transformation in the USA in the first half of the twentieth century, especially triggered by the institutional transformations within the country and by the possibilities that the two world wars opened for the nation. Decades ago, in his oft-quoted *The Physicists. The History of a Scientific Community in Modern America*, Daniel J. Kevles (1971) gave a full portrait of such changes and the ways governmental agencies, private trusts, old and new academic institutions, as well as a number of eminent names interacted and contributed to such a transformation.⁶ Millikan was one of those people who, with the qualities of the creative physicist, the entrepreneur, the manager, and the networker, helped to place American physics at the forefront of international science. Thus, it was not unsound that, in 1931, he was elected President of the re-founded IUPAP.

Having spent over two decades at the University of Chicago after obtaining his PhD in Columbia in 1895, Millikan became a very close collaborator of the astronomer George E. Hale (1868–1938) during the Great War and thereafter. In early 1917,

⁴ Silvan S. Schweber, *Nuclear Forces. The Making of the Physicist Hans Bethe* (Cambridge, MA: Harvard University Press, 2012), ch. 8.

⁵ A. Establier to J. Needham, October 1, 1946, folder D/XI/14, 7, (IICI).

⁶ Daniel J. Kevles, *The Physicists. The History of a Scientific Community in Modern America* (Cambridge, MA: Harvard University Press, 1971).

as it was clear that the USA was about to join the war in Europe, both Hale and Millikan took leave from their respective university jobs and spent all their time in war-oriented research through the newly created National Research Council (NRC). This was one of the institutional achievements of Hale, who intended to promote the rather dormant National Academy of Sciences (NAS) and develop its role as advisor to the government in scientific and technological matters. The NRC was a success during the war years, and once peace came Hale, Millikan, and a few others moved quickly to ensure the NRC would also become a key element in the promotion of science useful for the nation. One of many statements by Millikan at the end of the war may help us understand his mindset and his arguments in the promotion of practical science for the good of the nation:

Administrative positions in the industries are to-day being filled as never before from the ranks of the technically trained men. The War has taught the prospective officer that he can not hope for promotion unless he has scientific training. The War has taught the manufacturer that he can not hope to keep in the lead of his industry save through the brains of a research group, which alone can keep him in the forefront of progress. As a result of all this there is indeed a new opportunity in every phase and branch of science.⁷

Hale also convinced Millikan to move West and accept the Directorship of another of his creations: the new California Institute of Technology with its Norman Bridge Laboratory of Physics, a private research institution that would soon become a principal actor in the American research establishment thanks to, among others, the funds of the Carnegie and the Rockefeller foundations. The two men now controlled the NAS, the NRC, and Caltech making the psychologist and long-lasting editor of *Science*, James M. Cattell, say that “[w]hether the Research Council belongs to the National Academy, or the National Academy belongs to the Research Council, or both are satellites of Pasadena is a problem of three bodies that is difficult of solution. The Carnegie Corporation, the Rockefeller Foundation and the National Research Council are another problem of three bodies.”⁸

The decade of the 1920s saw the expansion of Caltech and the growth of Millikan’s fame, especially after he was awarded the 1923 Nobel Prize. He became one of, if not the most, visible faces of physics in the country, especially through his many public appearances and his popular books, articles, and interviews. In 1927, *Time* magazine described him as a “man of twinkling-grey eyes and sparkling wit [who] knows how to make scientific complexities charming as well as awesome.”⁹ In the words of one of his biographers, “he was, with the exception of Albert Einstein, the most famous scientist of his day in America. He was—a celebrity.”¹⁰

Among his many jobs in the 1920s, Millikan became involved in foreign relations to promote American science abroad. In 1922, he was appointed Foreign Secretary of

⁷ R. A. Millikan, “The New Opportunity in Science,” *Science* 50 (1919): 285–97, 297.

⁸ Quoted in Robert H. Kargon, *The Rise of Robert Millikan. Portrait of a Life in American Science* (Ithaca and London: Cornell University Press, 1982), 105.

⁹ Quoted in Kargon, *The Rise of Robert Millikan*, 148.

¹⁰ Kargon, *The Rise of Robert Millikan*, 148.

the NRC, as well as American member of the Committee on Intellectual Cooperation of the League of Nations. It was through these appointments that Millikan became, from the very beginning, part of the Union of Physics, being appointed as one of eight Vice-Presidents in 1922. He was also, as explained in the previous chapter of this book, responsible for emphasizing the “pure and applied” aspects of physics in the Union.¹¹

In 1931, with the transformation of the IRC into ICSU, IUPAP seemed to be on track for real activities. The lack of formal activities by the Union in the previous decade is manifest in the report on the accounts that Abraham gave at the 1931 General Assembly (GA). The Secretariat had been collecting the annual dues from the national member states, yet spent only a small fraction of the money simply on basic administrative expenses, amounting to a ten percent of the payments (actually, the expenses during those eight years were almost equal to the interest credited by the bank). With this, by 1931, the balance of IUPAP was 96.899,75 francs.¹²

The first decision of the third GA, on July 10, 1931, was to nominate Millikan as the next President. The appointment was made in absentia, although communication by cable that very same day between Brussels and Pasadena formalized the new presidency. Millikan was not in Europe at that time, but he would travel to Europe in October that year to attend the Volta conference in Como. On the way back to America, a letter to Max von Laue gives us a glimpse of Millikan’s views on and hopes for IUPAP and his Presidency:

... this union, of which Bragg has been the president, has been purposely quiescent until it could be made completely *international* in its membership; and finally, that when assurances came last summer, after conversations between Abraham (Paris) and Planck, Schrödinger and yourself, that the time had come when it could be made fully international it set about the organization of some active committees.¹³

This letter helps us to understand the mood in 1931. Abraham, Millikan, and a number of physicists were certain that Germany would soon join the Union after which it should start having formal activities. As a matter of fact, the GA decided to create two working commissions: one for Symbols, Units, and Nomenclature (SUN), under the presidency of Richard T. Glazebrook (1854–1935), and another one on Bibliography and Publications, coordinated by Blas Cabrera (1878–1945), Aimé Cotton (1869–1951), and Paul Langevin (1872–1946). The relationship between the commissions and the German membership is clear since, as Millikan also writes, these are “ready to function actively as soon as the German representation in their membership can be provided for, and they both have important work to do which should not be delayed.” The work of such commissions will be discussed later on.

¹¹ See chapter by Fauque and Fox in this volume for details.

¹² *Union internationale de physique pure et appliquée. Troisième assemblée générale. Bruxelles—10 et 11 juillet 1931. Procès-verbal.* Series B2aa “General Reports,” vol. 1, folder “1923–1960,” IUPAP, Gothenburg Secretariat, (hereafter IUPAP Gothenburg), Center for the History of Science, Royal Swedish Academy of Science.

¹³ R. A. Millikan to M. von Laue, November 25, 1931, roll 12, 550, RAM. Emphasis in the original.

With this letter, Millikan was joining Abraham in his efforts to materialize the incorporation of Germany into IUPAP. But, as will be seen in the next section, things were not that easy. Millikan also worked to get the Italians back in the new IUPAP, after conversations in Como. As a matter of fact, and certain that the Germans would almost immediately join the Union (“assurances have been obtained that the Germans will participate ... in all future activities of the International Union of Pure and Applied Physics,” he said), he wrote to Guglielmo Marconi (1874–1937) asking him “whether we may count on full Italian participation” in the forthcoming activities organized and coordinated by IUPAP, especially in regards the SUN Commission. Italy had joined the Union in 1925 but only paid its dues until 1927. In 1932 it re-joined the International Council of Unions and IUPAP.¹⁴

Millikan’s election to the presidency of IUPAP was also one more element in his efforts to internationalize American physics. The 1931 GA not only appointed him but agreed to hold the next meeting in Chicago in 1933. This was the grand plan Millikan had for his tenure: to bring a large number of European physicists to the USA in a meeting that would situate the country at the center of international physics; like the summit of the successful St Louis conference of 1904.¹⁵ Indeed, Chicago had long been planning a major fair to celebrate the centenary of the foundation of the city. Like all events of this kind, the fair was expected to be an event to attract business, trade, and academic conferences. It was the perfect venue for a major international event for physics.

As a matter of fact, as early as June 9, 1930, as Foreign Secretary of the National Academy, Millikan received a letter from the organizing committee of the 1933 Chicago World Fair, asking the academy for advice and inviting them to coordinate the major scientific events during the celebrations. “The directors of this Fair,” so the letter said, “consider it at once a national and a scientific undertaking,” arguing that “in keeping with the importance of the event, with the scientific character of the exhibition and with the dignity of the occasion” the National Academy should be the one selecting and sending the invitations.¹⁶ Two things here are important for our story. First, the letter mentions up to eighteen international scientific and professional unions but does not include IUPAP, a clear sign that, as already recognized, the Union of Physics was latent or dormant. The second is the limited offer to provide funds to invite foreign scientists:

If the Directors of the Fair were to guarantee ocean transportation for a certain very limited number of men in each international organization, what sum would you estimate as necessary for this purpose? In other words, we should greatly appreciate your judgement as to what organizations ought to be invited and how many men ought to be subsidized in the manner which I have indicated.¹⁷

¹⁴ Italy had been a member of IUPAP since 1925 but stopped paying the dues in 1927. When they “re-joined” in 1932, they paid all the annual memberships due since 1927. See Roberto Lalli, “Cento anni di IUPAP,” *Il Nuovo Saggiatore* 39 (2023): 45–56.

¹⁵ See Richard Staley, *Einstein’s Generation: The Origins of the Relativity Revolution* (Chicago: Chicago University Press, 2008).

¹⁶ H. Crew to R. A. Millikan, June 9, 1930, roll 6, 732, RAM.

¹⁷ H. Crew to R. A. Millikan, June 9, 1930, roll 6, 733, RAM.

It is clear that Millikan took the offer to heart and included it in his plans for the coming years. Since he was one of the Vice-Presidents of the latent IUPAP, in February 1931 he received Abraham’s invitation to take part in the July meeting in Brussels that would re-found this and other unions. In May, he replied apologizing for not being able to attend (his plans to attend the Como conference were certainly more pressing), but he mentioned for the first time the possibility of organizing a big event on physics in Chicago:

I would like to suggest that inasmuch as the Chicago Exposition in the summer of 1933 will unquestionably bring to it a very large number of the world’s physicists, it might be a very excellent time for holding a meeting of the International Union. The management of the Exposition has asked ... to recommend to it a group of eighty scientists outside of the United States who may be invited to meet with it there in the third week in June, 1933, and read papers, and I think that it was planned to pay at least the traveling expenses of all these invited guests. This would seem to make this time and place, therefore, a very logical one for the meeting of the International Union.¹⁸

This offer was a trigger to elect Millikan as President of IUPAP for the next three years, since the choice of the venue for 1933 preceded the election of the new President. Although Millikan himself was not in Brussels in July 1931, and neither was the current President, Bragg, Frank Schlesinger (1871–1943) and Arthur E. Kenely (1861–1939), the two American delegates at the meeting, sent notes on how the discussions unfolded. The first question to be addressed was the place for the following meeting. Paris, London, and Chicago were the three options, and the latter was unanimously voted for. “The Chairman then suggested,” so the report follows, “that it would thus be very appropriate if Dr. Millikan were elected President of the Union for the ensuing term, covering the date of the 1933 Chicago meeting. On motion, Dr. Millikan was so elected, unanimously.”¹⁹ The Century of Progress International Exposition, since such was the name of the Chicago Fair, was meant to become the first major event of IUPAP ten years after its formal approval.

Indeed, Millikan soon pushed for the scientific quality and institutional significance of the Chicago meeting. As already seen, in his urging of Marconi to secure the participation of an Italian delegation, in his conversations with Glazebrook in London in the Fall of 1931, and in a few letters thereafter, he pushed the SUN Commission to make haste on a first memorandum on the state of “the fundamental definitions of Electric and Magnetic Units,” so as to have international discussions underway during 1932 and make the Chicago meeting the place for an international agreement.²⁰

¹⁸ R. A. Millikan to H. Abraham, May 8, 1931, Roll 6, 769, RAM.

¹⁹ Notes of a Meeting of IUPAP, July 10–11, 1931, roll 6, 765–6, RAM.

²⁰ R. Glazebrook to M. von Laue and to G. Marconi, December 1, 1931, roll 12, 569–72, RAM. See also R. A. Millikan to G. Bonnet, May 9, 1932, roll 12, 637, RAM.

But Millikan's grand plan was soon to face the economic reality of the country and of the world. The crash of 1929 was only then beginning to kick in and to reduce budgets, cancel plans, and force politicians and administrators to make difficult choices. The Century of Progress International Exposition was one such event that had to be scaled down, and the invitation to foreign scientists reduced to the bare minimum. At the beginning of 1933, it was already clear that IUPAP would not meet in Chicago: "I was hoping that efforts which I had been making in other directions for the paying of the expenses of either one or both of yourself and Dr. Glazebrook to Chicago might be successful," wrote Millikan to Abraham, adding that "in view of the present situation it has been impossible to make this provision." And in a defeatist tone he concludes that "the meeting will necessarily have a diminished significance."²¹

He also tried to have IUPAP pay for, at least, Abraham and Glazebrook, but the latter informed that the decision had been to postpone the intended meeting, not least because the SUN Committee had not yet managed to produce a serious report, let alone achieved a significant international agreement on the matter of units and symbols.²² In the end, Millikan's grand plan was reduced to a one-day meeting of the "American section of the International Union of Pure and Applied Physics with Foreign Guests," on June 24, 1933. The papers by the "foreign guests," namely Glazebrook and Abraham were read in absentia by local physicists (Millikan and Kennelly, respectively).²³

In early August, Millikan reported in a rather over-optimistic letter to Abraham that the scaled-down meeting had been a success and that, while some expressed "fear that the Union might disintegrate if it did not soon hold a meeting which would demonstrate that it had both vitality and a real work to perform," Millikan saw "a large amount of useful activity in the field of symbols, units and nomenclature." Yet, he accepted that "the most important function of the Union will be the organizing and holding of international congresses."²⁴ As shall be seen later, IUPAP finally had its next GA in October 1934 at a large physics meeting in London and Cambridge organized mainly by the (British) Institute of Physics.

The downsizing of scientific events in the Chicago Exhibition was, of course, not the only casualty of the Great Depression. At the time Millikan was giving up his hopes for a historic physics meeting in Chicago, the NAS received news from the Secretary of State that the Congress was not going to allocate the usual amount of money to pay for the membership to the several international unions of ICSU. "With reference to the share of the United States as an adhering member of the International Research Council [sic] and associated Unions for the calendar year 1932," so the note went, "you are informed that in consequence of the failure of the 72nd Congress to make provision for these quotas it will be necessary to withdraw from the Unions."

²¹ R. A. Millikan to H. Abraham, February 16, 1933, Roll 12, 657, RAM.

²² R. Glazebrook to R. A. Millikan, April 14, 1933, Roll 12, 659, RAM.

²³ Minutes of the meeting of the American section of the International Union of Pure and Applied Physics with Foreign Guests, in roll 12, 662, RAM.

²⁴ R. A. Millikan to H. Abraham, August 4, 1933, roll 12, 666, RAM.

And it added that all diplomatic steps for the withdrawal would be made by “the appropriate diplomatic officers of the United States.”²⁵

Millikan soon drafted a response complaining that “adherence of the United States to these Unions was made ... through its National Academy of Sciences ... so that withdrawal, if desired, is to be effected through the action of the National Research Council,” not by the Government. The provisional solution was clear: that the NAS would “make strong efforts to find other sources than appropriation by Congress for the payment, for this year, of the dues in these organizations, in the hope that subsequent congresses will see fit to continue the long-established policy of meeting these dues in the future.”²⁶

To stress the point, he also prepared a report to be sent to the Secretary of State highlighting the importance of the unions and of ICSU as a way to secure a prime place for the nation in the international world of science. Indeed, Millikan would stress that “the presidents of a considerable number of the international scientific organizations are at present from the United States,” which showed the increasingly central role of American scientists like himself on the world stage.²⁷ The report also gave four examples of “important international activities,” one of which was the IUPAP Chicago meeting and the activities of the SUN Commission, which he aggrandized saying that “the discussion of the problem in symbols, units and nomenclature [was] a problem of fundamental importance to all the related sciences,” not only to physics.²⁸

The amount of money was not huge. The total sum of the membership fees was under \$5000, 3000 of which were devoted to the Geodetic and Geophysical Union (IUPAP was the cheapest, with only \$63 in 1932).²⁹ Since the creation of ICSU, the government had annually provided for the money, yet without a clear mandate. Now that things were tight, and in the absence of a legal directive other than precedent, the Congress rejected this allocation. It was time to start lobbying so as to solve the problem “not alone for this year, but for the future,” as Sol Bloom (1870–1949), a congressman for West Side Manhattan, assured the President of Columbia University, Nicholas Murray Butler (1862–1947): “I feel confident that we will be successful, and now that I know *you* are interested, the thought occurs to me that we *must* be successful.”³⁰

This situation remained in place for the dues of 1932 and 1933, but lobbying worked. A hearing in Congress on March 6, 1934, with the presence of “twenty-five scientific men who spoke or contributed statements in favor of the bill” introduced by Bloom was unanimously recommended for adoption.³¹ After that, the Senate also

²⁵ W. Carr to P. Borckett, March 16, 1933, roll 6, 794, RAM.

²⁶ R. A. Millikan to W. Carr, April 5, 1933, roll 6, 800, RAM.

²⁷ “Report of the Foreign Secretary of the National Academy of Sciences,” July 12, 1933, roll 6, 796, RAM. George E. Hale was President of ICSU, Frank Schlessinger of the International Astronomical Union (IAU), Millikan of IUPAP, Arthur E. Kennelly of ISRU (International Scientific Radio Union), Isaiah Bowman of the International Geographical Union.

²⁸ “Report of the Foreign Secretary of the National Academy of Sciences,” roll 6, 798, RAM. The wording of the report shows that it was partly written before the Chicago meeting.

²⁹ Albert Barrows, September 30, 1933, “NRC, Relationship with International Scientific Organizations,” roll 6, 805, RAM.

³⁰ Bloom to Butler, October 11, 1933, roll 6, 809, RAM. Emphasis in the original.

³¹ NRC, Division of Foreign Relations, Annual Report 1933–1934, roll 6, 825, RAM.

passed the bill, and the President signed it on June 16. Yet, that was not the end of the story because this item was not included in the “deficiency bill,” thus preventing the NRC from receiving the money from the government for the 1934 dues either,³² having to wait until the following year to normalize the situation.

The German Question ca 1931

Immediately before and after the 1931 GA, Abraham had been in touch with members of the German physics community. Indeed, as the person who was behind the wheel in drafting the new statutes, he even traveled to Berlin to discuss the wording with Planck, Schrödinger, and others, so as to ensure that, immediately after their approval, German physicists would join the Union. His hope was that Germany would send an official delegation to Brussels and become a founding member of the new IUPAP. But things were not moving that fast on the German side. Planck, but especially Schrödinger, seemed to be very actively promoting the process, and the *Deutschen Physikalischen Gesellschaft* (DPG) had already set up a specific committee to discuss the matter. On June 13, under the presidency of Planck and the Austrian physicist Egon Schweidler (1873–1948), the committee however decided that no official delegation could be sent to Brussels and that the matter should be studied further, once the new statutes had been approved. The GA of the DPG, due to take place in September, should be the one to decide on the matter. Eventually, Walther Gerlach (1889–1979) and Emil Rupp (1898–1979) were “cordially greeted” as observers at the GA of IUPAP.³³

As Schrödinger reported immediately, there were a number of misgivings on the German side. First, no official delegation could be sent to Brussels since the IRC was still active and the exclusion of Germany was, from their point of view, still in place. Abraham tried to play this down arguing that while the letter of the old statutes said so, the spirit was that “in reality the meeting in Brussels will be a truly constitutive assembly so as to establish the Union on a new basis and all delegations will have the same powers.”³⁴ Moreover, Abraham was also certain that the meeting would be agreeable and that the new statutes would be approved without much discussion: “this is not just a personal impression,” he said, since he had sent the existing draft to all the delegates and “nobody had raised any objections.”³⁵ Yet, this objection probably shows that not everybody in Germany had forgiven their exclusion a decade earlier.

In any case, this was not the most difficult point to solve. International unions had been built under the assumption that members would be nations through their national academies or similar representative bodies. But Germany was far from having such a centralized structure and there was more than one institution representing physicists, the most important of which seemed to be the DPG and the *Gesellschaft für*

³² Office Memorandum 97 (Barrows), June 23, 1934, roll 12, 855–6, RAM. The bill was HR 6781. The fiscal year ended at the end of June, so no more provisions could be made for the budget.

³³ *Union internationale de physique pure et appliquée. Troisième assemblée générale. Bruxelles—10 et 11 juillet 1931. Procès-verbal*, 3, series B2aa “General Reports,” vol. 1, folder “1923–1960,” IUPAP Gothenburg.

³⁴ H. Abraham to E. Schrödinger, June 7, 1931, roll 6, 539, RAM.

³⁵ H. Abraham to E. Schrödinger, June 7, 1931, roll 6, 539, RAM.

Technische Physik (DGTP).³⁶ Because of that, both Planck and Schrödinger had asked how likely it was to have more than one society representing one nation. Moreover, the DPG also “contains sub-societies in Germany, in Austria and in Czechoslovakia,” which raised the problem of who would represent the Austrian physicists (the DPG or a “small Austrian society”)? Or, worse, who would represent the German speaking Czech physicists (the DPG or the Czech Society, since the latter was already a member of the Union)?

Schrödinger was correct when, in early June, he urged Abraham to do all he could to encourage the German society to join as soon as possible (“*je souhaite l’accomplissement ... très vivement et très empressément!*”) for fear of “imponderable dangers” that would derail the whole project.³⁷ As he feared, in September 1931 the annual GA of the DPG decided to create yet another commission, with three members from the DPG and three from the DGTP to study the matter.³⁸ In the same meeting, Max von Laue became President of the DPG.

This is, thus, the context of Millikan’s letter to von Laue previously quoted. In it, Millikan acknowledged the creation of the new six-person panel, and inquired “whether you do not think it possible that this committee can meet and act in the very near future.”³⁹ At stake was the commencement of the activities of the new IUPAP, especially the preparation of the Chicago meeting and the work of the SUN Committee. At the same time, and in the hope of speeding up the process, Glazebrook also urged von Laue by explaining that the new commission he was heading had started working immediately on a number of issues (see the next section). “Had Germany been a member,” he said, “the memorandum when settled, would have been sent to the Association of German Physicists adhering to the Union, with a formal request for their help.” And he went on saying that “In work of this kind it is clearly important to obtain the views of such a body and the object of this letter is to ask how this may be done. The matter is urgent.” Glazebrook’s suggestion was as follows.

Clearly the most satisfactory way of securing this would be that the Committee of which you are Chairman should come to an early decision and recommend adherence to the Union of Physics. Is this a possible course? Failing this have you any possible alternative which would give me as Chairman of the S.U.N. Committee your valued help from the commencement of our deliberations?⁴⁰

This “diplomatic enquiry,” as Glazebrook called it, did not work.⁴¹ The committee had already met in October and “had decided that the time for affiliating had not yet come.” As for some German participation in the SUN consultations, von Laue suggested to contact Julius Wallot (1876–1960), the representative of the German

³⁶ In 1930, the DGTP had 1370 members, slightly more than the 1320 of the DPG.

³⁷ E. Schrödinger to H. Abraham, June 5, 1931, roll 12, 538, RAM.

³⁸ M. Planck to H. Abraham, October 8, 1931, roll 12, 532, RAM.

³⁹ R. A. Millikan to M. von Laue, November 25, 1931, roll 12, 550, RAM.

⁴⁰ R. Glazebrook to M. von Laue, December 1, 1931, roll 12, 570, RAM.

⁴¹ R. Glazebrook to R. A. Millikan, December 1, 1931, roll 12, 567, RAM.

Committee for Units and Formulas. Schrödinger's fears of delays sine die were materializing.

A derivative of this deferment, as many still saw it, was the situation of IUPAP within the new ICSU. The agreement with Schrödinger and Planck was to clearly word the new statutes in a way that IUPAP would not necessarily be a part of the former IRC or the new ICSU; else, the Germans would find it difficult to join. In early January 1932, the General Secretary of ICSU, Henry Lyons, asked about it and Abraham replied that "the situation of the International Union of Physics regarding the International Council needs to remain in suspense until after the adhesion of our German colleagues in the International Union of Physics."⁴² The consequence of this was that IUPAP would not have a delegate in ICSU and, of course, they would not pay dues.

Henry Lyons and possibly also George Hale, the President of ICSU, did not share Millikan and Abraham's interpretation of the statutes. Since IUPAP had never left the IRC, so the argument went, it immediately became a part of ICSU. As a compromise, and also in view that other members of the Executive Council of IUPAP such as Martin Knudsen (1871–1949) and Willem H. Keesom (1876–1956) agreed with Lyons,⁴³ Millikan accepted sending the two statutory delegates to the first Executive Council of IUPAP to be held in London in May 1932 and wait for a formal decision at the next GA of IUPAP (still expected to take place in Chicago). The two appointed representatives were Glazebrook and Cotton, but due to last-minute urgent matters neither could attend, and Abraham sat in for them at the meeting in London.⁴⁴

Ironically, as mentioned in the previous section, it was at that meeting that Italy re-joined ICSU and, later, also IUPAP, thus contributing to the interpretation of the statutes given by the International Council.

Two Commissions at Work

As already mentioned, the 1931 GA agreed the creation of two commissions within IUPAP, both with a clear internationalist and inter-unionist vocation: the SUN Committee and a Commission for Bibliography and Publications. Neither comes as a surprise, since both topics had already been present in the discussions leading to the creation of the IRC in 1918.⁴⁵ Let us start with the latter. Coordinated by Blas Cabrera (1878–1945), Aimé Cotton (1869–1951), and Paul Langevin (1872–1946), its mission was to promote that "each scientific memory ... be accompanied by a summary," and to "organize a mechanism so that those summaries can be quickly communicated to the bibliographical journals of the different countries."⁴⁶ This project transcended

⁴² H. Abraham to H. Lyons, January 7, 1931, roll 12, 583, RAM.

⁴³ M. Siegbahn to H. Abraham, in H. Abraham to R. A. Millikan, April 27, 1932, roll 12, 635, in RAM.

⁴⁴ H. Abraham to R. A. Millikan, June 29, 1932, roll 12, 654, RAM.

⁴⁵ See the paper by Fauqué and Fox, this volume.

⁴⁶ *Union internationale de physique pure et appliquée. Troisième assemblée générale. Bruxelles—10 et 11 juillet 1931. Procès-verbal*, 5, series B2aa "General Reports," vol. 1, folder "1923–1960," IUPAP Gothenburg.

the world of physics and, as Cabrera reported to IUPAP, a meeting of the International Institute of Intellectual Cooperation (IIIC) held in Paris in March 1932 linked the unification of scientific terminology to the need for a centralized bibliographical repository: a resolution of the IIIC promoted that “steps be taken to constitute ... an international centre of documentation with a view to facilitating the unification of terminology used in physics, chemistry, biology and the other natural sciences.”⁴⁷ Indeed, the 1947 IUPAP GA described this group of three physicists as simply the representatives of the Union in the Commission for the Coordination of Terminologies created in 1932 by the IIIC. There is no evidence of any further reference to the IUPAP Bibliography Commission.

The SUN commission did do some work, partly due to the influence of Glazebrook, who had been the first Director of the National Physics Laboratory (NPL) in the UK in the first two decades of the 20th century and who, though now formally retired, still held much political power and influence. As a matter of fact, the SUN Committee seems to have emerged from a discussion at the Brussels July 1931 GA of IUPAP where the British delegation (i.e., Glazebrook himself and Ezer Griffiths, also an NPL man)⁴⁸ should define the unit of heat. As a result of this proposal at the GA, “a ‘sous commission’ was appointed to deal with Symbols, Units and Nomenclature in Physics and to report to the Union.”⁴⁹ And already in the first meeting of this “sous commission,” probably taking place during the days of the GA, two resolutions were put forward: (1) “that the unit of heat when measured in units of energy be the Joule defined as equivalent to 10^7 ergs,” and (2) “that the gramme-calorie is the amount of heat required to raise the temperature of one gramme of water from $14,5^\circ$ to $15,5^\circ$ of the International Scale of Temperature.”⁵⁰

It comes as no surprise that Glazebrook pushed for the creation of this commission. In previous years, he had been involved in discussions at NPL on the need to internationally coordinate standards since “at present there is much waste of time involved in comparing figures deduced from standards, which are unnecessarily varied.”⁵¹ Symbolic proof that there was an intent of doing serious and coordinated work is that Glazebrook and Griffiths, the latter introducing himself as its Secretary, started sending correspondence with letterheaded paper with the name of the SUN Committee printed on it and used the NPL as its formal address.

One of the first things the commission was involved in was in connection with the units in thermodynamics. W. H. Keesom, one of four members of the SUN Committee and Director of the Leiden laboratory, formally communicated to Glazebrook the status quo of long discussions on thermodynamic units among low-temperature physicists. In 1928, those present at the fifth International Congress of Refrigeration in Rome had decided to form a special committee to “formulate propositions as to

⁴⁷ Cabrera, Report on the meeting of the Committee on the Coordination of Scientific Terminology, Paris, March 18 and 19, 1932, roll 12, 619–20, RAM.

⁴⁸ These were the only two representatives of Britain at the GA of 1931. *Union internationale de physique pure et appliquée. Troisième assemblée générale. Bruxelles—10 et 11 juillet 1931. Procès-verbal, series B2aa* “General Reports,” vol. 1, folder “1923–1960,” f. [7] (IUPAP Gothenburg).

⁴⁹ R. Glazebrook, letter August 5, 1931, Department of Scientific and Industrial Research (DSIR) 10/20, The National Archives UK, Kew, London (hereafter NAUK stands for National Archives of the UK).

⁵⁰ R. Glazebrook, letter August 5, 1931, DSIR 10/20, NAUK.

⁵¹ C. Egerton to R. Glazebrook, Memorandum re Physical Constants, June 1931, DSIR 10/20, NAUK.

a system of nomenclature and symbols for the different functions used in thermodynamics as well as a definition of a unit of entropy.”⁵² The commission had already proposed the word “enthalpy” for the function $U + pV$, and to denote internal energy by the symbol U , and S for entropy. Keesom suggested that the SUN Committee of IUPAP should discuss the proposal and contribute to the discussions led by the International Institute of Refrigeration, as well as trying to include IUPAC in the conversation. So, in a way, the first task the SUN Committee assumed was, in a way, to join in an already backed agreement on some thermodynamic units. This was approved in Buenos Aires in 1932.⁵³

A more problematic issue was that of electric units. In September 1931, the Harvard-based A. E. Kennelly, who was Associate Director of the International Electrotechnical Commission (IEC) and Chairman of its section B for Electric and Magnetic Magnitudes and Units, and had acted as one of two American delegates in the 1931 IUPAP GA, met with Glazebrook and Griffiths in London during a meeting of the IEC. Debates on the right units for magnetic induction (B) and magnetic fields (H) among electrical engineers had been underway for a few years,⁵⁴ and Kennelly suggested the new SUN commission should get involved; partly to advise them, but also to make sure physicists did not add to the jumble, since “this confusion is also reflected in certain text-books of physics.”⁵⁵

To meet this challenge, in early 1932, Glazebrook, who was also chairman of the Electrical Standards and Units Committee at the NPL,⁵⁶ sent a memorandum to all national unions of physics with a number of questions dealing with systems of electrical units and asking national committees to reply as soon as possible: “It is hoped on receipt of this information to prepare a memorandum summarizing the views of Physicists in the Countries adhering to the Union in a form suitable for discussion by the General Assembly.”⁵⁷ The goal was to prepare a report ready to be discussed and approved by the intended 1933 Chicago meeting and GA.

It is clear that Millikan wanted to make sure the other members of the American section of IUPAP, A. H. Compton, F. D. Foote, W. L. Severinhaus, W. F. D. Swann, and H. W. Webb, were aware of the importance of taking part in the discussion so as to get as many physicists as possible involved. “The subject,” he said, “is of such importance that this committee should only act as a transmitter of the best judgments that can be found in the country as to desirable changes.”⁵⁸ That is why F. K. Richtmyer, Chairman of the Division of Physical Sciences of the NRC and W. F. G. Swann, President of the American Physical Society were included in the discussions on the American side. But the Chicago meeting never happened and no consensus on the matter was reached.

⁵² W. H. Keesom to R. Glazebrook, September 7, 1931, roll 12, 528, RAM.

⁵³ *Union internationale de physique pure et appliquée. Quatrième assemblée générale. Londres, 5 octobre 1934. Procès-verbal* (Paris: Hermann, 1936), in series B2aa “General Reports,” vol. 1, folder “1923–1960,” f. [15], IUPAP Gothenburg.

⁵⁴ See Fauqué and Fox in this volume for further details.

⁵⁵ A. E. Kennelly to R. A. Millikan, February 18, 1932, roll 12, 597, RAM.

⁵⁶ J. E. Petavel to R. Glazebrook, January 18, 1933, DSIR 10/20, NAAK.

⁵⁷ E. H. Griffiths to R. A. Millikan, January 27, 1932, roll 12, 589, RAM.

⁵⁸ R. A. Millikan to W. F. D. Swann, March 2, 1932, roll 12, 604, RAM.

The issue was not settled in 1933, nor at the 1934 London meeting and GA. In 1935, Kennelly would again contact Glazebrook, as chairman of the SUN Committee, and Abraham, as Secretary of IUPAP, asking for advice on another issue. The plenary meeting of the IEC had unanimously voted a resolution to adopt the Giorgi system of four absolute practical units. Three of them were universally settled (metre, kilogram, and second), but the fourth one was in dispute (ohm, volt, ampere, coulomb, farad, henry, or weber were the candidates). “It was decided,” Kennelly reported, “that the choice should not be made before consulting the international Union of pure and applied Physics S.U.N. committee and the Comité International de Poids et Mesures Comité consultative d’Electricité.”⁵⁹ Glazebrook’s response is symptomatic of the functioning of the SUN Committee: before trying to get the views of the other members, an opinion should be asked locally, of English electricians and of the Electrical Units and Standards Committee of the NPL. With that, as he had done in 1932, he would prepare a memorandum to circulate among the other national members of IUPAP.⁶⁰ Sadly, Glazebrook, who was already eighty by this time, would die later that year and with him the SUN Committee would lose its driving force.

Although not directly the work of the commission, Millikan and Abraham received two requests for funds in the early years of the 1930s. One seems to have been agreed during Bragg’s presidency: support for the work leading to the publication of the second edition of the crystallographic tables. Interestingly, the only major grant IUPAP gave in the interwar period (37,000 francs, over one-third of the total budget of the Union between 1922 and 1934) went to the German physicist specialized in crystallography, Paul P. Ewald (1888–1985). The story goes as follows. After a conference on crystal structure organized in London by the Faraday Society in 1929, Bragg promoted deeper international collaboration in sharing and standardizing information among crystallographers. The commitment was to support the efforts of Ewald as co-editor of the journal *Zeitschrift für Kristallographie* in producing a table of crystallographic structures. The first outcome was published in 1931 as *Strukturbericht Volume I (1913–1928)* by Ewald and Carl Hermann and, finally, in 1935, the two-volume *Internationale Tabellen zur Bestimmung von Kristallstrukturen*. “Ewald’s activities as one of the editors of the *Zeitschrift*, as co-editor of the *Strukturbericht*, and as one of the prime movers behind the *Internationale Tabellen* contributed greatly to the growth of an autonomous international crystallographic community,”⁶¹ to the extent that, after World War II, and having been forced to emigrate from Germany in 1937, he was promoted and was the first President of the International Union of Crystallography.

The second petition came from Charles Marie, the long-lasting editor of the *Tables annuelles de constantes et données numériques de chimie, de physique, de biologie et de technologie*.⁶² In the 1930s, Marie would ask for advice on whether the spectroscopic constants, a field of “exceptional development” should be included in the Annual

⁵⁹ A. E. Kennelly to H. Abraham, June 27, 1935, DSIR 10/20, NAUK.

⁶⁰ R. Glazebrook to E. H. Griffiths, July 3, 1935, DSIR 10/20, NAUK.

⁶¹ Harmke Kamminga, “Paul P. Ewald and the Building of the Crystallographic Community,” in *P.P. Ewald and his Dynamical Theory of X-Ray Diffraction*, ed. D. W. J. Cruickshank, H. J. Juretschke, and N. Kato (Oxford: Oxford University Press, 1992), 42.

⁶² See chapter by Fauque and Fox in this volume.

Tables and, if so, would IUPAP give a grant for these to be published?⁶³ Conversations continued and there was praise for Marie's work with the tables among the members of IUPAP;⁶⁴ but no formal agreement seems to have been reached until the 1934 meeting, where 5,000 francs were promised for this project.⁶⁵ Charles Marie was grateful to Millikan for his efforts in getting support from Richtmyer and the NRC, as well as for IUPAP's decision. The latter was particularly welcome due to "the resistance we have found among pure physicists, many of whom do not seem to value the usefulness" of the tables.⁶⁶ Millikan, who had promoted the inclusion of "applied" in the name of the Union of Physics, was almost certainly flattered by this praise.

Niels Bohr's Failed Presidency

In the same way Millikan had been elected President of the Union in absentia in 1931, so was Niels Bohr appointed President during the GA of 1934 in London. After the fiasco of the plans for the Chicago Conference, IUPAP met during a major conference for physics that took place at London and Cambridge in October 1934.⁶⁷ The succession of events of this story is yet another sign of the lack of coordination and the troubled path the Union underwent in the interwar period. As the outgoing President, Millikan had a conversation with Bohr on the phone telling him about his election. Millikan's letter to Abraham reads as follows:

"I called Bohr on Saturday telling him we had "had a most distinguished congress the climax of which was the election of Bohr as president." Today I have a reply reading: "Please extend hearty thanks to congress for great honor" Bohr.

"So, thanks to yourself and Sir Richard Glazebrook the Union is now 'well on its way, with flying sails.' Congratulations! ! I hope our German troubles too will soon be past. Copenhagen will be an ideal place in which to bring them in."⁶⁸

This letter seems to show that, although Bohr had not attended the London meeting, Glazebrook and Abraham had pulled the strings to have him elected as President as the best way to boost the Union. The news of the election was transmitted by Millikan, not on the phone, as Millikan seems to imply, but on a telegram with the text: "Fitting climax to distinguished congress enthusiastic election of Bohr as president." To this, Bohr replied with the telegram previously mentioned, giving the impression that he had accepted. But this letter also shows that Millikan, Abraham, Glazebrook, and others thought that Bohr's presidency would help solve the "German troubles."

⁶³ C. Marie to R. A. Millikan, November 20, 1931, roll 12, 549–50, RAM.

⁶⁴ C. Marie to R. A. Millikan, January 27, 1932, roll 12, 589–90, RAM; F. K. Richtmyer to R. A. Millikan, April 1, 1932, roll 12, 624, RAM.

⁶⁵ *Union internationale de physique pure et appliquée. Quatrième assemblée générale. Londres, 5 octobre 1934. Procès-verbal* (Paris: Hermann, 1936), 3–4. In series B2aa "General Reports," vol. 1, folder "1923–1960," f. [8] (IUPAP Gothenburg).

⁶⁶ C. Marie to R. A. Millikan, January 22, 1935, roll 6, 127, RAM.

⁶⁷ See chapter by Fauque and Fox in this volume.

⁶⁸ R. A. Millikan to H. Abraham, October 1934, series E2 "Correspondence with Council Members," vol. 1 "1934–1999," folder M, IUPAP Gothenburg.

And this was the great misunderstanding between the outgoing Executive Committee and the newly elected President.

History seemed to be repeating itself. As seen at the beginning of this chapter, after the GA that, in a way, re-founded IUPAP along the lines of the transformation of the IRC into ICSU, there was a great expectation that German physicists would soon join IUPAP. But things never materialized, in spite of the untiring efforts of Abraham and Millikan.

Bohr's election and apparent acceptance in 1934 seems to have happened under the misunderstanding that it was merely a kind of honorary recognition, not the appointment of President of the Executive Council. This information, which he “first learnt after the return of Knudsen to Copenhagen ... has brought me personally in a most difficult situation, since from the very creation of the international research council I have officially taken the position not to cooperate in the work of the council and its unions, before the perfect international character of these organizations was attained.”⁶⁹ Indeed, though the Danish Academy was part of IUPAP and other unions, Bohr had “never been a member of the committee of the Danish academy which represents the physical union in our country, of which Kudnsen is chairman, and thus it happens that I was so ignorant as regards the functions of the union.”⁷⁰ Bohr also thought that he had to be consistent with the stance he had taken from 1919 and remain away from the Union, since “the present moment would be very inopportune for such steps. Indeed, the difficulties which we all then felt have been ever increasing on account of the deplorable political development in the countries which are not yet represented in the research council.”⁷¹ In other words, Bohr did not distinguish if threats to “total” internationalism (in Europe) came from the excessive sense of revenge by the victors of the Great War or from the new nationalist regime in Germany.

Unaware of this misunderstanding, as Abraham was preparing the official report of the fourth GA, he wrote to Bohr formally asking for his acceptance to be the next President, in the understanding that he had already committed. As a matter of fact, this letter not only congratulates him on his appointment but immediately goes into business with things related to the publication of abstracts from the London conference, the possible increase in the fees that member countries were paying, and the organization of the next congress and GA in Copenhagen in three years' time.⁷² To Abraham's surprise, Bohr's response in the negative came at the same time as Millikan received the news directly from Bohr.

The resignation of Bohr from the presidency left the Union at a standstill. And nothing was done about the matter until 1937, when Bohr visited the West Coast of the United States and met with Millikan. As the latter reported to Abraham, Bohr kept thinking that he “should not act at this moment as the President of the International Union wholly due to what he considers to be the demands of ‘diplomacy,’” and

⁶⁹ N. Bohr to R. A. Millikan, October/November 1934, ID: 01/01/007, The Niels Bohr Archive, Niels Bohr Institute, Blegdamsvej 17, 2100 København, Dinamarca.

⁷⁰ *Ibid.*

⁷¹ *Ibid.*

⁷² Abraham to Bohr, November 19, 1934, series E2 “Correspondence with Council Members,” vol. 1 “1934–1999,” folder R, IUPAP Gothenburg.

he agreed with the move to ask Enrico Fermi to accept the official presidency and organize the next conference and GA in 1938 in Copenhagen.⁷³ The idea seemed to have come from a conversation in early 1937 between Bohr, Langevin, and Abraham. But that did not go through either: Fermi rejected the offer with reasons “of extreme modesty.”⁷⁴

The next in line was the Swedish physicist Manne Siegbahn (1886–1978), with whom Abraham met at some point in London. This time, the proposition was successful, although this meant that the intended 1938 conference should take place in Sweden rather than Denmark. The preserved correspondence between Abraham, Millikan, and Bohr on this matter shows how the former, as Secretary of the Union, somehow regarded Bohr as the formal President, since he was not only informed about all the steps he was taking but was also asking for his approval.⁷⁵ But this opened another can of warms: Knudsen had agreed to hold the 1938 meeting in Copenhagen on the understanding that Fermi (or Bohr) would be the President. But now that the choice seemed to be Siegbahn, it “looked only natural” to hold the meeting in the country of the new President, namely Sweden (Uppsala and Stockholm as the two obvious options). In case the Executive Council wanted to hold the meeting in Copenhagen, so Knudsen suggested, the presidency should be offered to Professor Peder Oluf Pedersen (1874–1941), whose “physical works are well known and are of great importance, and who is used to and very able to preside over these kind of international meetings.”⁷⁶

To Abraham’s despair, by the spring of 1938 no decision had been taken on whether to hold a meeting that fall, either in Copenhagen or in Sweden. Neither materialized, and in 1939 he was again urging Bohr to support the organization of a meeting like the one in London in 1934, because since then IUPAP had not had a GA. His suggested place and date were Paris some time in 1940, for which he had obtained the support of the French Society of Physics and the French Society of Electrical Engineers.⁷⁷ Indeed, the meeting never happened, and by the end of the decade, the only known activities in which IUPAP participated were three conferences organized by the *Institut International de Coopération Intellectuelle* in 1938 (Warsaw and Neuchâtel) and 1939 (Strasbourg).

Coda

In his letter to Siegbahn discussing preparations for the possible conference in Copenhagen in 1938, Abraham was still hopeful that the Germans might join the Union, “in spite of everything,” and that the meeting should be prepared considering

⁷³ R. A. Millikan to H. Abraham, March 23, 1937, roll 12, 743, RAM.

⁷⁴ H. Abraham to N. Bohr, September 22, 1937, series E1, vol. 5, folder 38 “IUPAP Larkin Kervin. Correspondence Re: Archives,” IUPAP, Quebec Secretariat (hereafter IUPAP Quebec), Center for the History of Science, Royal Swedish Academy of Sciences.

⁷⁵ Ibid.

⁷⁶ M. Knudsen to H. Abraham, October 5, 1937, series E1, vol. 5, folder 38 “IUPAP Larkin Kervin. Correspondence Re: Archives,” IUPAP Quebec.

⁷⁷ H. Abraham to N. Bohr, May 10, 1939, series E1, vol. 5, folder 38 “IUPAP Larkin Kervin. Correspondence Re: Archives,” IUPAP Quebec.

the possibility of German participation.⁷⁸ As previously seen, that meeting never happened, let alone the incorporation of Germany to IUPAP. The fiasco with Bohr’s Presidency and the death of Glazebrook in 1935 left Abraham almost alone as the most engaged physicist in keeping the agonizing Union alive. Abraham never saw the following GA.

⁷⁸ H. Abraham to M. Siegbahn, March 26, 1938, series E1, vol. 5, folder 38 “IUPAP Larkin Kervin. Correspondence Re: Archives,” IUPAP Quebec.