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International Union of Crystallography
Eleventh General Assembly and International Congress of Crystallography
Warsaw, Poland, 3–12 August 1978

Table of Contents

Introduction and Opening Ceremony

By invitation of the Polish Academy of Sciences, the Eleventh General Assembly and International Congress of Crystallography were held at the Palace of Culture and Science, Warsaw, Poland, 3–12 August 1978.

The meetings were attended by 1516 scientists of whom 319 were from Poland, and the remainder from the following 37 countries: Austria, Australia, Bangladesh, Belgium, Brazil, Bulgaria, Canada, People's Republic of China, Czechoslovakia, Denmark, Arab Republic of Egypt, Finland, France, German Democratic Republic, Federal Republic of Germany, Hungary, India, Iran, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Romania, Saudi Arabia, South Africa, Spain, Sweden, Switzerland, Syria, Turkey, UK, USA, USSR, Yugoslavia.

The General Assembly and Congress were opened formally on the afternoon of 3 August by Professor W. TRZEBIATOWSKI, Member of the Presidium of the Polish Academy of Sciences and Chairman of the Polish Honorary Committee. The ceremony commenced with speeches of welcome by Professor TRZEBIATOWSKI and Professor W. NOWACKI, President of the Polish Academy of Sciences, followed by a message from the Chairman of the Council of the State, Professor H. JABŁOŃSKI, which was read by Professor J. AULEYTNER, Chairman of the Congress Organizing Committee. Professor K. ŁUKASZEWICZ, Chairman of the Congress Programme Committee, then explained some details of the Congress programme and Professor A. MAGNÉLI, President of the IUCr, replied to the speeches of welcome on behalf of the Union. Professor N. V. BELOV presented the Congress Discourse entitled *Historical Aspects of the Derivation of the* 230 *Space Groups*, in commemoration of the 125th anniversary of the birth of Professor E. S. Fedorov. After a short break there followed a film about present-day Warsaw, a display of Polish folk dances and a cocktail party, before the first session of the General Assembly.

Eleventh International Congress

Scientific programme

The scientific programme included (i) the Congress Discourse by Professor BELOV mentioned above, and six General Lectures; *X-ray studies of the structure and organization of biologically important proteins* by T. L. BLUNDELL, *New intense sources of X-ray and neutron radiation and new detectors* by A. GUINIER, *Real imperfect crystals* by Y. QUÉRÉ, *Crystal structure information in chemistry* by B. JEŻOWSKA-TRZEBIATOWSKA, *Three-dimensional reconstruction in electron microscopy* by B. K. VAINSHTEIN, and *Crystallographic contributions to the energy problem* by M. K. WILKINSON. Approximately 1200 contributed papers were presented at poster sessions held in the afternoons, whilst four or five parallel sessions were held in the mornings for oral presentation of invited papers, for panel discussions or for open meetings organized by the Union's Commissions. The Chairmen of the morning sessions had been responsible for determining the programmes of these sessions. The detailed plan for the scientific programme had been compiled by an international Programme Committee at a preparatory meeting in August 1977. The abstracts submitted were printed, by direct reproduction of the typescript copy, in a book of collected Abstracts and in a Supplement to *Acta Crystallographica* Section A. A copy of the Supplement was sent to all subscribers to *Acta Crystallographica* and the *Journal of Applied Crystallography*.

Exhibitions

A commercial exhibition of crystallographic equipment, an exhibition of crystallographic books and non-commercial exhibitions of crystallographic equipment and data, and of photographs and drawings were held in the Palace of Culture and Science.

Social events

Various excursions, a concert and a banquet were organized for all participants, whilst a more extensive programme was arranged for those accompanying the Congress participants.

Minutes of the Eleventh General Assembly

These minutes have been prepared by J. N. King, Executive Secretary, under the authority of S. E. Rasmussen, General Secretary and Treasurer of the Union.

Introduction and list of delegates

Sessions of the General Assembly were held on the evenings of Thursday 3 August, Friday 4 August and Tuesday 8 August, and the morning of Saturday 12 August, in the Congress Hall or the Sala Warszawska of the Palace of Culture and Science. The following list shows the names of the official delegates appointed by the Adhering Bodies and of the alternates who substituted at one or more sessions. The names are listed by the countries to which the respective Adhering Bodies belong, and the number of votes of the Adhering Body is given in parentheses after the name of each country. The names of the Chairmen of the delegations are printed in bold type; those of alternates are marked by an asterisk. The names of officially appointed delegates who were not present at any session of the Assembly are not included.

Australia (3): H. Freeman, A. F. Moodie* (present only on 4 August), **T. M. Sabine,** N. C. Stephenson (present only on 3 and 8 August).

Austria (1): A. Preisinger (absent on 4 August and 12 August).

Belgium (2): G. S. D. King (absent on 12 August).

Brazil (3): A. F. Craievich (present only on 12 August), Y. P. Mascarenhas (present only on 8 August), **R. Rodrigues da Silva** (absent on 12 August).

Canada (3): F. Brisse, **I. D. Brown,** L. D. Calvert* (present only on 8 August).

China, People's Republic of (4): Chang Yuan-lung, Huang Chin-ling, Liang Ching-kuei, **You-chi Tang.**

Czechoslovakia (1): J. Garaj (absent on 12 August), A. Linek* (present only on 12 August).

Denmark (1): K. Drenck (absent on 8 August).

Egypt, Arab Republic of (1): M. S. Ahmed.
Finland (1): K. Kurki-Suonio.
France (4): **A. Authier**, B. Busetta* (present only on 4 August), R. Comès, R. Fouret (present only on 8 August), A. Guinier (absent on 12 August), G. Tsoucaris* (present only on 3 August).
German Democratic Republic (2): O. Brummer* (present only on 12 August), **H. Neels**, M. Schenk (absent on 12 August).
Germany, Federal Republic of (4): U. Bonse (absent on 12 August), W. Bronger, W. Eysel* (present only on 12 August), K. Fischer, **H. Schulz**.
Hungary (1): K. Sasvári (absent on 4 August), L. Zsoldos* (present only on 4 August).
India (1): B. N. Das* (present only on 12 August), P. Krishna (present only on 3 and 8 August), R. Srinivasan* (present only on 4 August).
Israel (1): F. H. Herbstein (absent on 12 August).
Italy (3): **A. Coda**, G. Filippini, A. Vaciago.
Japan (4): S. Hosoya* (present only on 8 and 12 August), M. Kakudo (present only on 3 August), N. Kasai* (present only on 8 August), K. Kohra (present only on 3 and 4 August), N. Morimoto, **Y. Saito**, Y. Takéuchi* (present only on 12 August).
Netherlands (3): P. T. Beurskens* (absent on 3 August), D. Feil (present only on 3 and 4 August), **A. Vos** (absent on 12 August), P. M. de Wolff (present only on 3 and 8 August).
New Zealand (1): W. T. Robinson.
Norway (1): K. Maröy.
Poland (1): Z. Bojarski (present only on 3 and 4 August), J. Leciejewicz* (present only on 8 and 12 August).
South Africa (1): M. J. Laing.
Spain (3): **S. García-Blanco**, S. Martínez-Carrera, A. Perales* (absent on 3 August), J. Rodríguez-Martínez (present only on 12 August).
Sweden (2): **S. Abrahamsson**, P. Kierkegaard.
Switzerland (2): G. C. Chapuis* (present only on 12 August), P. Engel (absent on 12 August), **W. M. Meier** (absent on 12 August), K. Yvon* (present only on 12 August).
UK (5): L. S. Dent-Glasser, M. Hart, D. G. Watson, **A. J. C. Wilson**, M. M. Woolfson.
USA (5): S. C. Abrahams, J. P. Glusker, C. K. Johnson (absent on 12 August), J. Karle, **M. H. Mueller**, R. A. Young* (present only on 12 August).
USSR (5): **N. V. Belov**, G. B. Bokiy, A. I. Kitaigorodsky (present only on 3 and 8 August), T. I. Malinovsky, S. A. Semiletov, S. P. Solovyev* (present only on 4 and 12 August).
Yugoslavia (1): D. Grdenić.

No delegates had been appointed by the Adhering Bodies in Argentina and Chile. The delegates from the People's Republic of China and the Arab Republic of Egypt were admitted to the General Assembly after their applications for membership of the Union had been accepted at the first session of the Assembly on 3 August.

Present as members of the Executive Committee: A. Magnéli (President; Chairman of the General Assembly), B. K. Vainshtein (Vice-President), S. E. Rasmussen (General Secretary and Treasurer), Dorothy Hodgkin (Immediate Past President), F. R. Ahmed, E. F. Bertaut, K. Kuchitsu, K. Łukaszewicz, S. Ramaseshan and D. P. Shoemaker (Ordinary Members). J. N. King (Executive Secretary) was also in attendance.

First Session, Thursday 3 August 1978, 7.45 p.m.

(1) *Introductory remarks by the President*

Professor MAGNÉLI welcomed the delegates and the observers.

(2) *Procedural matters*

In order to verify the list of voting delegates, the President requested the General Secretary to read this list, and asked delegates to indicate their presence when their names were called. (This procedure was repeated at the beginning of each session of the General Assembly).

Two delegates, G. S. D. King (Belgium) and D. Grdenić (Yugoslavia) were appointed to act as tellers when votes had to be counted during the Assembly.

(3) *Approval of Agenda*

The Agenda and the Appendices to the Agenda had been distributed to Secretaries of National Committees on 24 May 1978. The General Assembly approved the Agenda, and agreed unanimously to include in the Agenda the application from the Academia Sinica of the People's Republic of China for membership of the Union and the application for a change in Category of Adherence by the Adhering Body in Brazil (see Minutes 4 and 5). Additional items were added to the Agenda on 4 August (see Minute 10).

(4) *Applications for membership of the Union*

(*a*) Details of the application from the Academy of Scientific Research and Technology of the Arab Republic of Egypt had been distributed with the Agenda papers. The General Secretary reminded delegates that a National Committee for Crystallography had been formed with the following membership: Professor M. S. Ahmed (Chairman), Professor S. A. Abdel Hady, Professor A. M. Abdel Rehim, Professor N. A. Ahmed, Dr. I. S. Ahmed Farag (Secretary), Professor S. G. Shenoda and Professor F. H. Yousef. The Executive Committee had considered the application in August 1977 and recommended to the General Assembly that the Academy should be accepted as an Adhering Body in Category I. The application was accepted unanimously and Professor M. S. Ahmed joined the Assembly as the delegate of the Academy.

(*b*) An application from the Academia Sinica of the People's Republic of China had been received by the Executive Committee at its meeting in Warsaw on 31 July 1978. The Academia wished to adhere to the Union in Category IV and a provisional National Committee for Crystallography had been formed with the following membership: Professor You-chi Tang (Chairman), Professor Huang Chin-ling and Professor Chang Yuan-lung. The Executive Committee had considered the application and recommended to the General Assembly that the Academia should be accepted as an Adhering Body in Category IV. The full text of the application had been distributed to delegates. The application was accepted unanimously and Professors You-chi Tang, Huang Chin-ling, Chang Yuan-lung and Lian Ching-kuei joined the Assembly as the delegates of the Academia.

(5) *Change in Category of Adherence*

In June 1978 an application had been received from the Adhering Body in Brazil requesting a change in Category of Adherence from Category I to Category III. The Executive Committee had approved this request and it was now confirmed by the General Assembly. [It was subsequently learned that the Adhering Body in Brazil, the Conselho Nacional de Pesquisas, had been dissolved and replaced by the Conselho Nacional de Desenvolvimento Cientifico e Tecnológico in 1974. This change was confirmed by the Conselho in March 1979 and was approved by the Executive Committee in April 1979, subject to acceptance by the General Assembly.]

(6) *Replacement of an Adhering Body*

In October 1977 the General Secretary had been informed that the Akademiet for de Tekniske Videnskaber wished to be replaced by the Royal Danish Academy of Sciences and Letters as the Adhering Body representing the crystallographic community in Denmark. This change had been approved by the Executive Committee. The Category of Adherence remained unchanged at Category I. The Academy had formed a National Committee for Crystallography with the following membership: Professor K. Drenck (Chairman), Dr. E. K. Andersen, Dr. J. Danielsen, Dr. O. Dietrich, Dr. I. K. Larsen (Secretary), Professor A. R. Lindegaard-Andersen, Professor B. J. Lund, Professor H. Micheelsen, Professor H. Pauly and Dr. J. Villadsen. The General Assembly accepted the change in Adhering Body.

(7) *Approval of Minutes of the Tenth General Assembly*

The Minutes were approved and two copies were signed by the President and the General Secretary, in accordance with By-Law 1·13. There were no matters arising from the Minutes.

(8) *Amendments to the Statutes and By-Laws*

In accordance with the wishes of the Tenth General Assembly in August 1975, the Executive Committee had appointed a Sub-committee to examine the Statutes and By-Laws, with the following membership: The General Secretary (Chairman), D. W. J. Cruickshank and D. P. Shoemaker. The Sub-committee presented a report to the Executive Committee in 1977. The final report of the Sub-committee and a summary of the proposed amendments had been distributed to the National Committees and Commissions in March 1978, and a recommendation for a further amendment to the By-Laws was included in the Agenda papers distributed in May 1978. The Executive Committee had endorsed all the proposed amendments, and the General Secretary introduced the discussion of the report and the proposed amendments in the General Assembly. As a result of a lively debate, summarized below and in Minute 39, the proposed amendments were subjected to some revision. The amendments adopted by the General Assembly are incorporated in the revised Statutes and By-Laws which are given in Annex II to these Minutes.

(*a*) The first set of amendments concerned the association of other organizations with the Union, and arose from the request by the International Organization for Crystal Growth to become affiliated to the Union, as well as to IUPAC and IUPAP. Although no such category of association existed in the IUCr Statutes, the Tenth General Assembly decided to invite the IOCG to appoint a representative to the Union's Commission on Crystal Growth. In August 1976 the Executive Committee accepted the IOCG *de facto* until the Union's Statutes and By-Laws could be amended to allow for associated organizations, and until the General Assembly was able to consider the request of the IOCG for such association.

More recently the European Crystallographic Committee had also requested to be associated with the Union. However neither of these applications was under consideration during the present discussion, which was concerned with the question of amending the Statutes and By-Laws to permit some form of association.

A. J. C. WILSON (UK) pointed out that there was a need to avoid an unneccessary proliferation of the Statutes and By-Laws. What was now proposed amounted to the introduction of a new category of membership, at a somewhat lower level. S. C. ABRAHAMS (USA) observed that the Union already had liaison with the IOCG through a representative on their body. A. AUTHIER (France) noted that there would be a safeguard against excessive prolification of such bodies because the General Assembly would have to approve each application. A. VACIAGO (Italy) asked what would be the rights and privileges of such associated organizations. The General Secretary replied that the Executive Committee had not wished to specify any specific conditions on applications, and preferred to leave it to the General Assembly to decide this with regard to each application. P. KRISHNA (India) suggested that only non-profit organizations should be considered. T. M. SABINE (Australia) did not see any advantage in the introduction of such a category.

The Executive Committee was asked to provide further information to the General Assembly, and it was agreed to defer further consideration of this proposal, and the applications from the IOCG and the European Crystallographic Committee, until later (see Minutes 39, 40, 41 and 51).

(*b*) The General Secretary explained that a National Committee for Crystallography had requested that its invitation to host the Thirteenth General Assembly in 1984 should be considered by the present General Assembly, because conference centres suitable for a large Congress were booked several years in advance and, if the decision was not made until the Twelfth General Assembly in 1981 (as would be the normal procedure under the present Statute 5·3), it might be too late to book a suitable centre. It was proposed that a new By-Law 1·3 be introduced, rather than amend Statute 5·3. The By-Law would state that the General Assembly may provisionally determine the date and the place of the next but one ordinary meeting of the General Assembly.

M. M. WOOLFSON (UK) suggested that Statute 5·11 (*f*), which stated that the General Assembly shall have the power to decide on all other questions falling within the competence of the Union, already gave the General Assembly the authority to make such a decision, and there was no need to make any amendments. The General Secretary observed that this was not the opinion of the sub-committee. S. C. ABRAHAMS (USA) suggested that it would be better to amend Statute 5·3 by changing 'determined by the previous General Assembly' to 'determined by a previous General Assembly'.

After some further discussion the General Assembly approved the proposed new By-Law 1·3.

(*c*) The General Assembly approved the proposed changes to By-Laws 2·2, 7·1 and 7·2, which concerned the timetable for the presentation of nominations by the Executive Committee to the General Assembly and any subsequent nominations by the delegates, and were intended to give delegates as much time as possible to consider the Executive Committee's nominations.

(*d*) The sub-committee proposed the introduction of a new By-Law 7·7 to clarify the nomination and voting procedures, if it was necessary to fill the unexpired term of an office vacated by an ordinary member of the Executive Committee. Although the proposal was favourably received, it was felt that the wording of the new By-Law was not clear. A small *ad hoc* committee, consisting of the General Secretary, D. P. Shoemaker, S. C. Abrahams and M. M. Woolfson, was set up to clarify the wording of the By-Law (see Minute 39).

(*e*) The sub-committee recommended that no further modification should be made to the Statutes and By-Laws regarding the terms of service for Editors and Co-editors, that no changes should be made in the composition of the Executive Committee and that it would not be helpful to introduce Statutes or By-Laws regarding the free movement of scientists. These points were accepted by the General Assembly.

The President then adjourned the meeting at 9.40 p.m.

Second Session, Friday 4 August 1978, 6.45 p.m.

(9) *Message from the Somali Academic Authorities*

The President had received a message from Professor A. CODA, who was a member of the Italian delegation and was currently teaching at the National University of the Somali Democratic Republic. He presented the compliments of the Somali Academic Authorities to the General Assembly, with the hope that the meeting would be profitable. The Somali scientific community hoped at some later stage to be able to apply to join the Union.

(10) *Additions to the Agenda*

At the request of the Executive Committee it was agreed to include in the Agenda the question of Union representation on the ICSU Committee on Space Research and the ICSU Scientific Committee on Problems of the Environment.

(11) *Report of the Executive Committee*

The report of the Executive Committee on the activities of the Union since the Tenth General Assembly had been submitted to the National Committees and the Commissions in May 1978, in accordance with Statute 6·8, and follows these Minutes as Annex I, Appendix A. The report was accepted without discussion.

(12) *Financial Report*

A financial report, covering the calendar years 1975, 1976 and 1977, had been prepared by the Treasurer and had been submitted to the National Committees and the Commissions in May 1978. The report follows these Minutes as Annex I, Appendix B.

The Treasurer commented on the report with the aid of several slides. He reminded delegates that the accounts and the unit contribution were expressed in US dollars. As an example of the effects of changes in exchange rates, he showed the fluctuations in the value of the unit contribution when it was expressed in Swiss francs and in US dollars.

Looking at the Balance Sheet, which showed the balances in the various fund accounts at the end of 1974 and at the end of 1977, the Treasurer explained that the increased deficit for *International Tables* arose from the continuing work on the new volume on symmetry tables, which had yet to be printed. The most remarkable positive change in the Balance Sheet was the increase in the funds for *Structure Reports*, which was a recovery of the investment made in the publication of many volumes of *Structure Reports* to bring this series up to date. Taken as a whole, the Union was financially sound and there had been an apparent increase in the Union's funds as expressed in US dollars. However, if the financial position were expressed in other currencies it would not appear to be as strong.

The Union's funds were held in several different currencies and were subject to fluctuations in exchange rates, since it was necessary to express the accounts in one currency, namely the US dollar. Whilst it had been possible in the last triennium to purchase new bonds to replace some of those which had been redeemed, the Treasurer showed that the Union's reserves at present were not as large as in 1971 and 1972 if these reserves were expressed in Swiss francs.

For *Acta Crystallographica*, the number of pages published had increased steadily in recent years, whilst the number of subscribers had decreased. If these figures were extrapolated linearly, in 30 years' time the Union would be publishing 80 000 pages *per annum* but would have no subscribers. However there were now indications that the number of pages published each year was levelling out and that the size of the journal would not increase much in 1978 and 1979. Hence the Executive Committee had decided to increase the subscription rate by only 5% for 1979.

For the *Journal of Applied Crystallography* the number of subscriptions remained almost constant, although there was a fluctuation in the number of pages published because occasionally some issues contained papers presented at specialist conferences. Finally the Treasurer drew attention to the significant income in royalties from the sale of *Fantasy & Symmetry*, the North American edition of *Symmetry Aspects of M. C. Escher's Periodic Drawings*. A large number of copies of this book had been sold.

The financial report was accepted unanimously and, in accordance with Statute 5·10(*i*), the Treasurer and any other Officer or Chairman of a Commission were released from financial or other liability to the Union.

(13) *Reports of the Commissions*

The reports of the Commissions and their activities since the Tenth General Assembly had been distributed to the National Committees and the Commissions in May 1978, in accordance with Statute 8·4. They are reprinted as Annex I, Appendix C to these Minutes. The reports were taken as read but the Chairman of each Commission, or his substitute, was invited to say a few words about any further developments and to answer any questions. These verbal reports are summarized in Minutes 14–24. The reports on the Commission on *International Tables* and on the Commission on Crystal-

lographic Studies at Controlled Pressures and Temperatures were deferred until 8 August (Minutes 35–36).

(14) *Commission on Journals*

The Chairman of the Commission and Editor of *Acta Crystallographica*, S. C. ABRAHAMS, reported that the Commission had met for 2½ days immediately prior to the General Assembly. All aspects of editorial procedure had been discussed and a set of notes for Co-editors was in preparation, with the primary purpose of maintaining a uniformity of standards among all the Co-editors of both journals.

The Commission had proposed to the Executive Committee that the most efficient method of production of the journals would be to undertake in-house composition in Chester and to print the journals elsewhere. However this would be a major step for the Union to take and would need equipment costing about £100000–£120000. This expenditure should be recovered within five years. Dr ABRAHAMS thought that, by such action, the cost of the journals might be held constant or might even be reduced. In addition, the publication time should be reduced appreciably.

The Commission was also considering the possibility of defining much more closely the boundaries between *Acta* Section A and the *Journal of Applied Crystallography*, and the possibility of splitting *Acta* Section B into two sections, one of which would be devoted to biological, chemical, mineralogical and metallurgical crystallography and the other to crystal structure papers. Other matters discussed which might be of interest to delegates were the question of copyright and the possibility of obtaining some income from the photocopying of published articles, and methods of improving the quality of the present offprints of *Acta* articles.

G. S. D. KING (Belgium) asked whether the Commission had considered the use of microfiche and synopsis publishing. Dr Abrahams confirmed that these topics had been considered but the Commission did not like the synopsis journal. Most of the material which might be put on microfiche was at present available on deposit with the British Library.

The retiring Editor of the *Journal of Applied Crystallography*, R. A. YOUNG had nothing further to report.

(15) *Commission on* Structure Reports

The Chairman of the Commission and Editor of *Structure Reports*, J. TROTTER, had no further comments. In response to a question on the sales of *Structure Reports* the Treasurer observed that there were about 500 standing orders for each volume. Within three years of publication a total of about 600–700 copies had been sold. He felt that this was a rather low level of sales for such a useful publication, and the Executive Committee had tried to increase sales by encouraging reviews of the series in as many journals as possible. He asked delegates to draw the attention of their colleagues and their National Committees to the very low price of the earlier volumes of *Structure Reports*, which are sold in ten-year sets at a price of 100 Netherlands guilders.

(16) *Commission on Charge, Spin and Momentum Densities*

The Chairman of the Commission, E. F. BERTAUT, explained that the large membership of the Commission was necessary because the Commission covered so many techniques, including Compton, X-ray and neutron scattering, electron diffraction and positron annihilation, and that the Commission worked with the Commissions on Electron Diffraction, Neutron Diffraction and Crystallographic Apparatus.

(17) *Commission on Crystal Growth*

The Chairman of the Commission, A. AUTHIER, observed that, in addition to the normal activities within the Commission, contact was also maintained with other bodies such as IOCG, COSPAR and IUPAC. The Commission hoped to complete a list of films on crystal growth in the near future.

(18) *Commission on Crystallographic Apparatus*

In answer to questions, S. ABRAHAMSSON, who deputized for the Chairman of the Commission, R. Rudman, reported that there had been no further progress on the polarization ratio survey but that a bibliography had been completed on radiation safety standards.

(19) *Commission on Crystallographic Computing*

The Chairman of the Commission, G. C. BASSI, reported that 103 participants from 28 countries had attended the recent computing school held in The Netherlands, 24 July–1 August. The programme had included tutorial sessions and workshops concerned with program systems on both large computers and minicomputers, automatic data collection, molecular interactions, multidetectors and microcomputers. The school had led to the publication of a book on these topics [*Computing in Crystallography* (1978). Edited by H. Schenk, R. Olthof-Hazekamp, H. van Koningsveld & G. C. Bassi. Delft Univ. Press].

The proposed winter school in India in 1980, which was intended to help crystallographers in developing countries, was in particular need of strong financial support. A. GUINIER (France) considered that this school was the sort of activity which should attract funds from Unesco, whilst R. SRINIVASAN (India) observed that Unesco had provided substantial support for the international symposium held in Madras in January 1978 and sponsored by the Union.

(20) *Commission on Crystallographic Data*

D. G. WATSON, Chairman of the Commission, reported that the proposed working party was being established during the Eleventh Congress to study the problems of the exchange format FICS-FORM, and that Professor W. Nowacki had recently submitted his bibliography of mathematical crystallography for publication.

(21) *Commission on Crystallographic Nomenclature*

The Chairman of the Commission, S. C. ABRAHAMS, invited any delegates who were particularly interested in nomenclature problems to contact him. DOROTHY HODGKIN, Immediate Past President, observed that problems of nomenclature in certain fields did arise from time to time, and these problems should be referred to the Commission.

(22) *Commission on Crystallographic Teaching*

A. AUTHIER spoke on behalf of the Chairman of the Commission, C. A. Taylor, who was ill and unable to attend the General Assembly. The Commission hoped to hold a series

of summer schools in different geographical regions, taking particular note of the needs of crystallographers in developing countries. He reported that the pamphlet project was progressing well, with 12 pamphlets already written and many more in preparation, and he hoped that the Union would be able to undertake the publication of these pamphlets in due course. However, the pamphlets were in an experimental form and were not suitable for general publication in their present form. The President expressed his appreciation to Professor Taylor for his work on this project and as Chairman of the Commission.

(23) *Commission on Electron Diffraction*

K. KUCHITSU, who had been appointed Chairman of the Commission in 1977 following the resignation of K. Molière because of ill health, reminded delegates that two open Commission meetings would be held during the present Congress.

(24) *Commission on Neutron Diffraction*

The Chairman of the Commission, A. F. ANDRESEN, observed that the Commission was at present working on seven projects involving most of the members of the Commission. Since the bibliography on neutron diffraction given out by B. N. Brockhouse, McMaster University, Canada, had been discontinued, the Japan Atomic Energy Research Institute (JAERI) had agreed to prepare such a bibliography as a supplement to their bibliography on thermal neutron scattering. The first volume covering the period 1968–1978 was expected to be issued in 1979.

(25) *Size of Commissions*

In accordance with Statute 5·10(*d*), the Assembly had to determine the number of persons to be elected on the Commissions until the Twelfth General Assembly. The President reminded delegates that the numbers of elected members for each Commission did not include the Chairmen, and that several Commissions also had *ex officio* members.

The Chairman of the Commission on Crystallographic Studies at Controlled Pressures and Temperatures had requested that the number of elected members of this Commission be increased from six to eight, so that there might be better coverage of the areas of responsibility of the Commission. The Executive Committee recommended to the General Assembly that this change be approved.

Professor Hodgkin had suggested that there were some fields where there were serious nomenclature problems but that these problems did not necessarily directly concern the Editors of the Union's publications, who were the present (*ex officio*) members of the Commission on Crystallographic Nomenclature. She had suggested that the membership of the Commission might be expanded to include one or two elected members, who were seriously concerned with nomenclature problems. The President explained that the Executive Committee had considered the matter carefully, and felt that it might be better to leave the present membership of the Commission unchanged, but to create *ad hoc* groups to deal with any particular problems in nomenclature which arose.

R. A. YOUNG, retiring Editor of the *Journal of Applied Crystallography*, could see the need for more active consideration of nomenclature problems, and he liked the idea of appointing *ad hoc* groups to investigate specific problems. However, he drew attention to the problem caused by the use of the same word for different things in different sub-fields of nomenclature. This sort of problem could be overlooked by specialized *ad hoc* groups and he wanted to be assured that the Commission would be fully consulted on any recommendations made by the *ad hoc* groups.

A. J. C. WILSON, former Chairman of the Commission on Crystallographic Nomenclature, asked the Executive Committee which fields it regarded as being in need of urgent treatment. DOROTHY HODGKIN replied, mentioning the fields of disordered structures and crystal growth.

B. K. VAINSHTEIN proposed that the number of members of the Commission on Neutron Diffraction should be increased from nine to ten. E. F. BERTAUT felt that the growing field of lattice dynamics was not sufficiently covered by the Commission.

R. SRINIVASAN (India) suggested that the size of the Commission on Crystallographic Teaching should be increased in order to include members from developing countries. The President observed that, whilst there was a desire to have world-wide representation on a Commission, it was also necessary to limit the size of a Commission in order that it might work efficiently. Several Commissions found it useful to appoint consultants with specific knowledge on special subjects. The Commission on Crystallographic Teaching had about ten consultants in addition to its elected members. D. FEIL (Netherlands) supported Dr Srinivasan's request. He felt that the developing countries had specific problems in the teaching of crystallography. If the Commission was to tackle these problems, then it should have the benefit of advice from members from these countries. S. ABRAHAMSSON (Sweden) considered that one of the major difficulties in the work of a Commission was to get its members together for a meeting, and it is more difficult to do this if there are very many members. He preferred the idea of appointing consultants for specific projects.

On behalf of the Commission on Crystallographic Teaching, A. AUTHIER observed that it had two members and several consultants from developing countries and that all its members and consultants were treated in the same way. He emphasized that the Commission was very concerned with the needs of developing countries. A tremendous effort had been made to bring people from these countries to the Erice Summer School, and the Commission was planning to hold similar schools in developing countries.

W. T. ROBINSON (New Zealand) asked that scientists from the more remote parts of the world, such as his country, should not be restricted from membership of Commissions on geographical grounds. He understood that most of the work of the Commissions was done by correspondence and he suggested that the Union should look to these countries for members of Commissions more frequently than had been done in the past. The President reminded delegates that the Executive Committee wished to receive cooperation from crystallographers throughout the world and that he had sent a letter to all National Committees inviting suggestions for Commission members. S. C. ABRAHAMS (USA) observed that there was a steady tendency for the size of Commissions to be increased in recent years. He was opposed to any further increase unless it was really essential.

The General Assembly approved the Executive Committee's proposal to increase the number of elected members of the Commission on Crystallographic Studies at Control-

led Pressures and Temperatures from six to eight. It was decided not to change the size of the Commission on Crystallographic Nomenclature, but to appoint *ad hoc* groups as necessary to consider specific nomenclature problems. The proposal to increase the size of the Commission on Neutron Diffraction was not approved. The numbers of elected members approved by the General Assembly are set out below (Chairmen of Commissions not included):

Commission on Journals	0
Commission on *Structure Reports*	0
Commission on *International Tables*	0
Commission on Charge, Spin and Momentum Densities	11
Commission on Crystal Growth	7
Commission on Crystallographic Apparatus	7
Commission on Crystallographic Computing	7
Commission on Crystallographic Data	8
Commission on Crystallographic Nomenclature	0
Commission on Crystallographic Studies at Controlled Pressures and Temperatures	8
Commission on Crystallographic Teaching	9
Commission on Electron Diffraction	9
Commission on Neutron Diffraction	9

(26) *Reports of the Representatives on bodies not belonging to the Union*

In accordance with Statute 8·5, the reports of the Representatives on bodies not belonging to the Union had been submitted to the National Committees and the Commissions in May; they are printed as Annex I, Appendix D to these Minutes. The reports were taken as read, but the representatives were invited to inform the Assembly of any further developments (see Minutes 27–33).

The representatives on the IUPAP Commission on the Solid State and the Conference Committee of the European Physical Society had nothing further to add and were not asked any questions by delegates. The representatives on the ICSU Committee on the Teaching of Science and on the ICSU Committee on the Moon and Planets were unable to be present.

(27) *International Organization for Crystal Growth*

A. AUTHIER had nothing to add to the written report, but expressed the hope that the relationship between the IOCG and the Union would be formalized by the IOCG becoming associated with the Union.

(28) *ICSU Abstracting Board*

A. J. C. WILSON reported that the recent meetings of this body had included a rather successful seminar in Paris on the on-line revolution in information, followed by the full Board meetings in Toulon. The ICSU AB was very concerned with the developments in copyright law.

(29) *ICSU Committee on Data for Science and Technology*

D. G. WATSON referred to *CODATA Bulletin* 24, which was a compendium of data sources in crystallography, and asked delegates to advise him of any new printed sources on crystallographic data or other kinds of compilations, since it was his responsibility to keep this information updated.

(30) *ICSU CODATA Task Group on Solubility Data*

The President reminded delegates that the Union's involvement with this project had been terminated.

(31) *ICSU Committee on Space Research (COSPAR). Working Group on Materials Sciences in Space*

E. KALDIS had continued to encourage this body to undertake more fundamental research, and he hoped that several fundamental aspects of zero-gravity experiments would be discussed and investigated in the near future. In answer to a question from M. HART (UK), Dr KALDIS explained that the Working Group had tried to referee proposed scientific investigations, but that their efforts were not always well received. However the situation was improving.

(32) *ICSU Committee on the Moon and Planets*

Taking note of the written report of the Union representative, the Executive Committee decided not to present a nomination to the General Assembly for continued Union representation on this body.

(33) *ICSU Committee on Science and Technology in Developing Countries (COSTED)*

The General Secretary mentioned that COSTED had provided travel grants for crystallographers to attend various Union activities including the present Congress, and he asked all the delegates to make known the work of COSTED in providing financial assistance, particularly travel funds, to young scientists from developing countries.

(34) *IMA–IUCr Joint Committee on Nomenclature*

The President reported that this joint committee of the International Mineralogical Association and the Union, which had been set up in 1970, had completed its work and its final report had been published. The committee's Chairman had reported that there was no need for it to be continued and it had therefore been dissolved. The report of the committee is reprinted as Annex I, Appendix E to these Minutes.

The President then adjourned the meeting at 8.45 p.m.

Third Session, Tuesday 8 August 1978, 6.35 p.m.

(35) *Commission on* International Tables

The Chairman of the Commission, TH. HAHN, reported that the data for the space-group tables and the drawings for the new volume were undergoing a final checking, which would be completed by September 1978. Most of the text and the synoptic tables for the Introduction had also been prepared, but further revisions would be necessary.

On behalf of the delegates the President congratulated Professor Hahn on the great progress he had made with this extensive new volume.

(36) *Commission on Crystallographic Studies at Controlled Pressures and Temperatures*

C. T. PREWITT deputized for the Chairman of the Commission, S. Block, and reported that the Commission had held an open meeting on 8 August on applications of the diamond anvil cell in crystallography. This technique had recently become very important for studies at high pressures and, in some cases, high temperatures, and was yielding very high quality data for both single-crystal and powder work.

(37) *ICSU Committee on Space Research (COSPAR)*

The General Secretary introduced the discussion on the advisability of the Union becoming a member of this body.

He explained that the Union had sent a representative to COSPAR's Working Group on Materials Sciences in Space and Dr Kaldis had actively participated in the Plenary Sessions of COSPAR and this working group. Dr Kaldis considered it important that the Union became a full member of COSPAR and the President of COSPAR had invited the Union to join. This would give the Union's representative a right to vote, but would not involve the Union in any further financial commitment. The Executive Committee had considered the invitation and recommended that the Union should become a full member of COSPAR. The General Assembly approved this recommendation.

The President explained that, following this decision by the General Assembly, the election of a Union representative to this body would be considered on 12 August and the Executive Committee was nominating Dr Kaldis.

(38) *ICSU Scientific Committee on Problems of the Environment (SCOPE)*

DOROTHY HODGKIN reported that, when she attended the 1977 ICSU General Committee meeting, it had been suggested that the Union should take part in the work of SCOPE.

The Executive Committee had considered the matter and recommended that the Union should join SCOPE. If this met with the approval of the General Assembly the Executive Committee would nominate Professor P. Kierkegaard as Union representative. The General Assembly agreed that the Union should join SCOPE, and the President explained that the election of the Union representative would be considered on 12 August.

(39) *Amendments to the Statutes and By-Laws*

This was a continuation of the discussion at the first session of the General Assembly (Minute 8).

A revised wording of the proposed new By-Law 7·7 had been prepared by the *ad hoc* committee set up on 3 August and had been notified to delegates on 5 August. After a brief discussion the General Assembly unanimously approved the new By-Law.

The President reminded delegates that several documents had been distributed concerning both the proposed amendments to Statutes 1·2 and 5·11 and By-Law 1·3, to enable organizations to become associated with the Union, and the applications from the International Organization for Crystal Growth and the European Crystallographic Committee for such association. These documents included proposals from the delegates of the Royal Society (UK) and the National Academy of Sciences (USA).

The President proposed that the general question of associated status should be considered first and, if it was favourably received, the General Assembly should then decide upon the wording of the necessary amendments to the Statutes and By-Laws. Each of the applications for association could then be considered separately. The Executive Committee would like to see an efficient arrangement made which would enable the IOCG to become associated with the Union, but it did not have strong feelings on the exact wording to be incorporated into the Statutes and By-Laws. The President suggested that it would also be helpful to the development of crystallography in many areas of the world if there could be some kind of link between the Union and groups of countries which, by themselves, would find it difficult to become a full member of the Union. Similar arrangements would also be helpful to existing regional organizations.

M. H. MUELLER (USA) and A. J. C. WILSON (UK) proposed that (1) the term 'Associate Members', as originally proposed by the UK delegates, should be changed to 'Regional Associates' in Statutes 1·2(*i*) and 5·11(*f*); (2) the words 'into association' were unnecessary and could be deleted from Statutes 5·11(*f*) and 5·11(*g*); (3) the words 'of the Union' should be added to Statute 1·2(*j*) to bring it into conformity with Statute 1·2(*i*). Professor WILSON supported the use of the term 'Scientific Associates', which was used in the ICSU Statutes.

In response to a request from T. M. SABINE (Australia), the President proposed that the General Assembly should vote first on Statutes 1·2(*j*) and 5·11(*g*) which dealt with the Scientific Associates, followed by Statutes 1·2(*i*) and 5·11(*f*) which dealt with Regional Associates. Finally it should consider By-Law 1·3, since the exact wording of this By-Law would depend on the adoption of the above-mentioned Statutes. The Assembly then approved the proposed Statutes 1·2(*j*) and Statute 5·11 (*g*), and then proposed Statutes 1·2(*i*) and 5·11(*f*). The voting on the revised version of By-Law 1·3 was deferred until 12 August (Minute 51).

(40) *Application for acceptance as a Scientific Associate*

With the adoption of Statutes 1·2(*j*) and 5·11(*g*) the General Assembly was able to consider the application from the International Organization for Crystal Growth for acceptance as a Scientific Associate. The President reminded delegates of the documents concerning this application, which had been distributed previously, and he emphasized that no financial commitment was involved. The application was accepted unanimously without further discussion.

(41) *Application for acceptance as a Regional Associate*

With the adoption of Statutes 1·2(*i*) and 5·11(*f*) the General Assembly was able to consider the application from the European Crystallographic Committee for acceptance as a Regional Associate. The Executive Committee had considered the application immediately prior to the General Assembly and recommended acceptance of the application. The delegates had received details of the application, and the President confirmed that there were no financial commitments.

M. M. WOOLFSON (UK) wondered what the constraints were on having Regional Associates. Many countries in Europe were represented on the European Crystallographic Committee but there were smaller associations in other parts of the world. If the Assembly accepted the reasons for association given for the present application, would it be able to refuse any applications for other organizations? This might lead to some countries being represented in the Union several times, by virtue of their membership of several regional associations. The General Secretary thought that if the ECC was accepted as a Regional Associate, no other European association with similar goals would apply or be accepted. J. KARLE (USA) thought that the type of application under consideration could have a major effect on the character and structure of the Union, and on the bodies it represented. He asked that the matter be given more thought, perhaps over the next three years. P. T. BEURSKENS (Netherlands) considered that, if the ECC obtained an

official status within the Union, this would improve contacts between crystallographers in different parts of Europe.

O. KENNARD, President of the ECC, expressed surprise at the trend of the discussion. Since its formation the ECC has felt itself to be part of the Union and it had encouraged the Union's Commissions to hold open meetings at the European Crystallographic Meetings. It had changed the dates of its 1979 meeting, so as to avoid a clash with another meeting sponsored by the Union. The only formal steps proposed in connection with affiliation to the Union were the appointment of a Union representative to the ECC, the filing of the ECC's minutes with the Union and the presence of an ECC representative at the IUCr General Assembly, without voting rights. She emphasized that the application was simply a request for formalization of the relationship with the Union. She explained that Union sponsorship of the ECC's meetings was not sufficient in some countries to enable scientists to obtain permission to travel to the meeting. She felt that the acceptance of the ECC as a Regional Associate would make it easier to obtain such permission.

L. D. CALVERT (Canada) wondered whether it was a good idea for so many open Commission meetings to be held in a restricted area, such as Europe, as this might prevent scientists from more remote countries from attending these important meetings.

A. AUTHIER (France), speaking as a Commission Chairman and a former President of the ECC, considered it most important that the Commissions should meet between General Assemblies. The ECC had been keen to encourage such meetings but would be very pleased to see business and open Commission meetings organized anywhere else.

The General Secretary confirmed that many Commissions found it important to meet, but that most members could not obtain travel funds solely to attend a business meeting of the Commission. It was easier for them to obtain travel funds to attend a scientific meeting and, therefore, they could attend Commission meetings held in connection with a scientific meeting.

The General Assembly accepted the European Crystallographic Committee as a Regional Associate.

(42) *Sub-committee on the Union Calendar*

A summary of the activities of the Sub-committee was distributed with the General Assembly papers in May, and is given as Annex I, Appendix F to these Minutes.

The President reported that the Executive Committee had recently approved the Inter-Congress Meeting on Modulated Structures, to be held in Hawaii in March 1979, and a Summer School on the Characterization of Crystal Growth Defects by X-ray Methods, to be held in Durham later in 1979. The full details of sponsorship would be communicated to the organizers in due course. [As a result of changes in the arrangements for the summer school, the organizers subsequently withdrew their request for Union sponsorship.]

(43) *Introduction of a tax on Congress and Conference participants*

DOROTHY HODGKIN explained that ICSU had been suffering from considerable financial strains, particularly regarding its administration costs. There had been extensive discussion within ICSU on ways to meet these problems, and one method suggested was the introduction of a $5 tax on all participants at Congresses. It was proposed that half of this income would go to ICSU and the other half would be retained by the Unions. The Unions had been asked to consider this proposal. Professor HODGKIN felt that, since ICSU was as keen as the Unions to keep registration fees as low as possible, it seemed anomalous for ICSU to propose an extra fee of $5; if it became necessary for the Unions to provide funds to ICSU, this should be done by another method. The Executive Committee was also opposed to the proposal. The General Assembly rejected the proposal unanimously.

(44) *Discussion of the future policy of the Union*

Statutes 5·10(*l*) and 5·10(*m*) require the General Assembly to determine the general policy and the timetable for the period to the next General Assembly, and to give preliminary consideration to the activities of the Union for the three-year period following that General Assembly. The President reminded delegates that several meetings were to be held in this period and had been given Union sponsorship. No other points were raised.

(45) *Budget estimates and unit contribution for the period until the Twelfth General Assembly*

The budget estimates for the General Fund for the three-year period 1978–1980 had been sent to the National Commitees and Commissions in May; they are printed as Annex I, Appendix G. According to Statute 5·10(*k*), the General Assembly had to determine the unit contribution for the period to the next General Assembly. The Executive Committee proposed that the unit contribution should be increased from 1 January 1979 to $300 for the years 1979, 1980 and 1981. The National Committees had been advised of this intention in November 1976, January 1977 and January 1978. The present budget estimates for 1978–1980 were based on a unit contribution of $300 for 1979 and 1980.

The Treasurer reminded delegates of the figures he had shown in connection with the financial report for 1975–1977 (Minute 12) and that, although in recent years the unit contribution had been increasing when expressed in one currency, it had been decreasing when expressed in another currency. In the budget estimates for 1978–1980 he drew attention to the estimated yield from investments of $92 000. This estimate had been prepared assuming that the Union would not be making any major expenditure of capital. However, if the Union did undertake in-house composition, it might be necessary to sell substantial investments and the interest from investments would drop accordingly. The main increase in expenditure was for the support of scientific meetings, in accordance with the request of the Tenth General Assembly to increase this support.

A. J. C. WILSON (UK) had been asked by the Royal Society to remind the Executive Committee that the funds of the Royal Society were limited and that it could not commit itself to remain in Category V if the financial situation deteriorated further. The President thought that similar financial difficulties existed in many other countries.

The General Assembly approved the proposed increase in the unit contribution and also the budget estimates.

(46) *Date and place of the Twelfth General Assembly*

The President reported that an invitation had been received from the National Research Council of Canada and the Executive Committee recommended that this invitation

be accepted. On behalf of the National Research Council I. D. BROWN invited the Union to hold its Twelfth General Assembly and International Congress of Crystallography in Ottawa in 1981. He had been assured by the National Research Council that there should be no difficulties for any delegates attending the meeting, even for delegates from any country with which Canada had no diplomatic relations. A provisional booking had been made at Carleton University, on the outskirts of Ottawa, for the period 15–25 August 1981. It was the intention of the organizers of the Congress to keep the costs as low as possible, so as to encourage as many scientists as possible to attend.

The invitation from the National Research Council of Canada was accepted with acclamation.

(47) *Date and place of the Thirteenth General Assembly*

With the acceptance of new By-Law 1·3 (Minute 8) earlier in the General Assembly, it was possible for the delegates to give preliminary consideration to invitations for the Thirteenth General Assembly.

On behalf of the Arbeitsgemeinschaft Kristallographie, H. SCHULZ invited the Union to hold its Thirteenth General Assembly and International Congress of Crystallography in the Federal Republic of Germany in 1984. In recent years large congresses in this country had been held in congress centres and it was proposed that the same arrangement should be used for the IUCr Congress. After negotiations with various congress centres and local authorities, the Arbeitsgemeinschaft Kristallographie proposed that the Congress should be held at the Congress Centre in Hamburg. Professor SCHULZ confirmed that no difficulties were expected for participants from any countries and he assured delegates that every effort would be made to keep the costs of the meeting as low as possible.

The invitation from the Arbeitsgemeinschaft Kristallographie was accepted with acclamation. [The dates of the General Assembly and Congress were subsequently determined as 9–18 August 1984.]

M. M. WOOLFSON (UK) wished to express concern about the costs at recent Congresses, which made it difficult for young crystallographers to attend. He had deferred his remarks until the invitations for the next two Congresses had been accepted, because he did not wish his remarks to be misunderstood. He appreciated that the organizers of both these Congresses intended to keep the costs as low as possible, but he suggested that future invitations should be accompanied by some rough costing for the benefit of the delegates.

(48) *Confirmation of the appointments of the Editors of the publications of the Union*

In accordance with Statute 7·1, the initial appointments and reappointments of the Editors of the publications of the Union were made by the Executive Committee and were subject to confirmation by the General Assembly.

The President reminded delegates that Dr S. C. Abrahams (USA) had been appointed by the Executive Committee to succeed Professor A. J. C. Wilson (UK) as Editor of *Acta Crystallographica* from 1 January 1978, and that Professor M. Hart (UK) had been appointed to succeed Professor R. A. Young (USA) as Editor of the *Journal of Applied Crystallography* from the end of the present General Assembly. The Assembly unanimously confirmed these appointments for a period of three years, until the Twelfth General Assembly. The reappointments of the Editors of *Structure Reports* and *International Tables* were confirmed at the final session of the General Assembly (Minute 52).

A. GUINIER (France), who had been the first Editor of the *Journal of Applied Crystallography*, expressed the appreciation of the Union to Professor Young for his devotion to the journal. S. C. ABRAHAMS (USA) then expressed the appreciation of the Union to Professor Wilson, who had succeeded Professor Ewald as Editor of *Acta Crystallographica* in 1960 and had given so many years service to the development of this journal.

The President then adjourned the meeting at 8.40 p.m.

Fourth Session, Saturday 12 August, 10.25 a.m.

(49) *Procedural matters*

K. Kurki-Suonio (Finland) was appointed to act as a teller in place of G. S. D. King (Belgium), who was unable to attend this session of the General Assembly.

(50) *World Directory of Crystallographers*

The President thanked S. C. Abrahams (USA) for his work as General Editor of the Fifth Edition of the *World Directory of Crystallographers*, which had been published in 1977 and which was so useful to all crystallographers. He mentioned that plans were being made for a sixth edition of the directory.

(51) *Amendments to the By-Laws*

The President invited discussion on the revised wording of By-Law 1·3, which took note of the amendments to the Statutes concerning Regional Associates and Scientific Associates which were approved at the previous session (Minute 39). In response to a question from R. A. YOUNG (USA), the President confirmed that the By-Law should be interpreted as meaning that only one representative of each Regional Associate or Scientific Associate could be present at the General Assembly.

The proposed amendment of By-Law 1·3 was accepted unanimously.

(52) *Confirmation of the appointments of the Editors of the publications of the Union*

The General Assembly confirmed the reappointment by the Executive Committee of Professor J. Trotter as Editor of *Structure Reports* for a period of three years.

The President recalled that, in his report to the General Assembly, Professor Th. Hahn considered that the new volume on direct space would be ready for printing by the end of 1978. Professor Hahn was willing to remain Editor of *International Tables* until then, but was unable to consider any further work on *International Tables*. The Executive Committee had found that it was very difficult to find a person with the qualifications and the time to take on the position of Editor of *International Tables*, but the new Executive Committee would try to find a successor to Professor Hahn. The General Assembly confirmed the appointment of Professor Hahn as Editor of *International Tables* until the end of 1978.

(53) *Election of Chairmen and members of Commissions*

The nominations made by the Executive Committee for the Chairmen and members of Commissions had been notified to the delegates (and alternates) on 5 August. The

election to these offices had been deferred until the final session of the General Assembly, so as to give the delegates as much time as possible to study these nominations.

In the absence of other nominations being made by delegates, all persons nominated by the Executive Committee as Chairmen and members of Commissions were considered as elected. According to Statute 7·3, the Editors and Co-editors were automatically members of the Commissions set set up for the publications concerned. The Commission on Crystallographic Nomenclature consists of the Editors of *Acta Crystallographica*, *Journal of Applied Crystallography*, *Structure Reports* and *International Tables* with the first-named Editor as Chairman.

The full memberships of the Commissions including *ex officio* members, together with the addresses of the Chairmen, are given in Annex III.

(54) *Election of Representatives on bodies not belonging to the Union*

The nominations made by the Executive Committee for those representatives to be elected by the General Assembly had been notified to the delegates (and alternates) on 5 August. As no other nominations had been made by delegates, all persons nominated by the Executive Committee were considered as elected. The names and addresses of the Representatives of the Union, including those appointed *ex officio*, are given in Annex III.

(55) *Election of Officers of the Union*

In accordance with By-Laws 2·2 and 7·1, the nominations made by the Executive Committee for Officers of the Union had been notified to delegates (and alternates) on 3 August. As no nominations had been received from delegates for the Officers of the Union, the following were considered elected:

President:	N. Kato (Japan)
Vice President:	A. J. C. Wilson (UK)
General Secretary and Treasurer:	S. E. Rasmussen (Denmark)
Ordinary members:	J. Karle (USA)
	H. Neels (German Democratic Republic)
	V. I. Simonov (USSR)

The President then closed the General Assembly at 10.45 a.m.

Closing Ceremony, Saturday 12 August, 12.05 p.m.

Many members of the Congress attended this ceremony.

Votes of thanks

The following votes of thanks were approved with acclaim:

(*a*) W. T. ROBINSON, the delegate from New Zealand, spoke on behalf of the participants at the Congress. He thanked all the Polish people who had worked so hard for the success of the Congress, including the members of the local Organizing Committee and its ten sub-committees and their many helpers. He expressed everyone's gratitude to the Polish Academy of Sciences, its Institute of Physics and its Institute for Low Temperature and Structure Research, to the Institute of Nuclear Research and to the Committee of Crystallography of the Polish Academy of Sciences. He thanked the members of the Organizing Committee, J. Auleytner (Chairman), Z. Gałdecki and J. Leciejewicz (Vice-Chairman), T. Warmiński (Secretary), K. Bany, Z. Bojarski, T. Figielski, A. Furczak, H. Granat, B. Jakowlew, A. Janko, R. Łappa, K. Łukaszewicz, S. Olejnik, A. Peitraszko, J. Żmija.

(*b*) DOROTHY HODGKIN, the retiring Past President of the Union, expressed her appreciation of the scientific programme, in which the mornings had been devoted to the general lectures followed by concurrent oral sessions and the afternoons had been left free for the poster sessions to which everyone could contribute. She thanked the Programme Committee [K. Łukaszewicz (Chairman), S. C. Abrahams, N. Kato, O. Kennard, J. Leciejewicz, M. Marezio, H. Peibst, V. I. Simonov and A. Vos] for all that they had done to ensure such an excellent scientific programme.

(*c*) J. AULEYTNER, Chairman of the Organizing Committee, thanked the speakers for their kind expressions of gratitude. He also thanked the authorities of the Polish Academy of Sciences, and in particular Professor T. Orłowski (Vice-Secretary of the Polish Academy of Sciences), the retiring President and the newly-elected President of the Union, the Programme Committee, the Vice-Chairmen, Secretary and members of his Organizing Committee, and particularly H. Granat, K. Bany, J. Sach, and the staff of the travel bureau Orbis.

(*d*) Replying on behalf of the Programme Committee, K. ŁUKASZEWICZ expressed the hope that the Congress had investigated new fields for the future development of crystallography and had welcomed new people into the crystallographic community. If that was so, then the Congress had been worthwhile.

(*e*) The retiring President of the Union, A. MAGNÉLI, expressed his gratitude to the Polish authorities for their support of the Congress, which had been held under the high patronage of the Chairman of the Council of the State, Professor Henryk Jabłoński, and to the Polish Honorary Committee under the chairmanship of Professor W. Trzebiatowski. He thanked the retiring members of the Executive Committee, Professor B. K. Vainshtein, Professor Dorothy Hodgkin, Professor K. Kuchitsu, Professor K. Łukaszewicz and Professor D. P. Shoemaker, for their valuable assistance during his presidency. He was very pleased that the Union would continue to have the assistance of the General Secretary and Treasurer, the Executive Secretary and the staff in Chester. Professor MAGNÉLI then introduced the newly elected President, Professor N. Kato.

(*f*) Professor KATO expressed his appreciation of the honour and the responsibility of being elected President of the Union. He had also been conscious of the heritage of the Union from his first attendance at a Union Congress, in 1960, and the international and interdisciplinary character of the Union. He was particularly pleased that the Union now had two more members, and he observed that one of the great pleasures of our Union was the collaboration it fostered among physicists, chemists, biologists and mineralogists under the single name of crystallographers. He promised to do his best to help solve whatever problems the Union might face in the near future.

Professor MAGNÉLI then declared the Eleventh General Assembly and Congress officially closed at 12.37 p.m.

ANNEX I

Appendices to the Agenda of the Eleventh General Assembly

Appendix A: Report of the Executive Committee

Meetings

Since the Tenth General Assembly and International Congress of Crystallography in Amsterdam, many meetings have been held, or will be held prior to or immediately after the Eleventh Congress, under the sponsorship or co-sponsorship of the Union. These meetings are: Third International Conference on Vapour Growth and Epitaxy, Amsterdam, The Netherlands, 18–21 August 1975; Summer School on X-ray Dynamical Theory and Topography, Limoges, France, 18–26 August 1975; Course on Crystal Growth, Erice, Italy, 30 August–7 September 1975; Third European Meeting on Ferroelectricity, Zürich, Switzerland, 22–26 September 1975; COSPAR Symposium on Materials Science in Space, Philadelphia, USA, 9–10 June 1976; Symposium on Direct Methods, Buffalo, USA, 3–6 August 1976; Sagamore V, Kiljava, Finland, 16–20 August 1976; Second Europhysical Conference on Lattice Defects in Ionic Crystals, Berlin, Federal Republic of Germany, 30 August–3 September 1976; Third European Crystallographic Meeting, Zürich, Switzerland, 6–10 September 1976; Fifth Iber-American Congress of Crystallography, Madrid, Spain, 10–17 December 1976; Bat-Sheva Seminar on Electron Density Mapping in Molecules and Crystals, Rehovot, Israel, 18–28 April 1977; Third International Summer School on Crystal Growth, University of New Hampshire, USA, 10–15 July 1977; Fifth International Conference on Crystal Growth, Boston, USA, 17–22 July 1977; Fourth European Crystallographic Meeting, Oxford, UK, 30 August–3 September 1977; Summer School on Teaching Crystallography for Today's Sciences, Erice, Italy, 5–15 September 1977; Fourth International Conference on Ferroelectricity, Leningrad, USSR, 18–23 September 1977; International Conference to mark the 50th Anniversary of the Discovery of Electron Diffraction, London, UK, 19–23 September 1977; Fourth International Conference on Small-Angle Scattering, Gatlinburg, USA, 3–7 October 1977; International Symposium on Biomolecular Structure, Conformation, Function and Evolution, Madras, India, 4–7 January 1978; Fifth International Symposium on the Organic Solid State, Waltham, Mass., USA, 13–16 June 1978; Fourth International Conference on Vapour Growth and Epitaxy, Nagoya, Japan, 9–13 July 1978; International Summer School on Crystallographic Computing, Twente, The Netherlands, 24 July–1 August 1978; Summer School on Diffraction Studies of Non-Crystalline Substances, Pécs, Hungary, 14–18 August 1978; Conference on Diffraction Line Profile Analysis, Cracow, Poland, 14–15 August 1978.

The Executive Committee met in Amsterdam, The Netherlands, in August 1975 on the occasion of the Tenth General Assembly, in St. Nizier, France, 23–25 August 1976 and in Zvenigorod, USSR, 10–13 August 1977.

At the Executive Committee meeting in 1976 the most important items of business were (1) sponsorship of meetings; (2) approval of the audited accounts for 1975; (3) subscription rates for 1977 and other matters concerning the Union's journals, including changes in printing methods and discussion of possible new Editors for the journals; (4) review of progress with *Structure Reports*, including the publication of cumulative indexes; (5) new volumes of *International Tables for Crystallography* and the need to reprint Volume I of the present series; (6) General Fund estimates and level of the unit contribution for 1979–1981; (7) reprinting *Symmetry Aspects of M. C. Escher's Periodic Drawings*; (8) Fifth Edition of the *World Directory of Crystallographers*; (9) publication of a supplement to the *Index of Crystallographic Supplies*; (10) association of the International Organisation for Crystal Growth with the Union; (11) the Programme Committee for the Eleventh Congress and arrangements for the General Assembly and Congress; (12) the work of ICSU; (13) Twelfth General Assembly.

At the Executive meeting in 1977 the most important items of business were (1) prospective new members of the Union; (2) sponsorship of meetings; (3) approval of the audited accounts for 1976; (4) discussion of the arrangements for the Eleventh General Assembly and Congress with the Programme Committee; (5) subscription rates for 1978 and other matters concerning the Union's journals, including the appointment of new Editors, the publication of the Congress Abstracts and changes in copyright laws; (6) possible new formats for *Structure Reports*; (7) the new volume on direct space of *International Tables for Crystallography*; (8) the General Fund estimates and the reappraisal of the level of the unit contribution for 1979–1981; (9) appointment of a new Chairman of the Commission on Electron Diffraction; (10) the report of the Sub-committee on the Statutes and By-Laws; (11) Union representation on other bodies; (12) the proposed site for the Twelfth General Assembly and Congress; (13) the work of ICSU; (14) suggestions received from the National Committees for membership of the Executive Committee and the Commissions.

More detailed reports of the activities of the Union are contained in the annual reports of the Executive Committee, which are published in Section A of *Acta Crystallographica*.

Publications

The Union's publication programme has continued to be a most important service to the crystallographic community. The Executive Committee has devoted considerable attention to the control and minimization of costs in all stages of publication. For the journals, the deposition scheme, which was originally introduced to cope with structure factor tables and other voluminous material, has been extended to include thermal parameter tables. Over 3000 items have been accepted for deposition whilst only about 180 requests have been received for any of the material deposited. Most of these requests have been for structure factor tables.

In 1975 the number of pages in Section A of *Acta*

Crystallographica was 880 and in Section B was 2944, making a total of 3824 pages excluding the 44-page joint index and the supplement containing 338 pages of abstracts communicated to the Tenth Congress. In 1976 and 1977 the total numbers of pages increased to 4398 (Section A, 1038; Section B, 3360) and 5020 (Section A, 1046; Section B, 3974) respectively.

In 1975, the *Journal of Applied Crystallography* consisted of 698 pages, excluding indexes. In 1976 the number was 514 pages and in 1977, 510 pages. The April 1975 issue of the journal contained papers or abstracts of papers presented at the International Discussion Meeting on Studies of Lattice Distortions and Local Atomic Arrangements by X-ray, Neutron and Electron Diffraction, which was held in Jülich, Federal Republic of Germany, 29 April–3 May 1974.

Structure Reports has been brought up to date. Volumes 28, 30A–35A and 37–39A were published in 1975, Volumes 34B, 37B–39B and 40A in 1976, and Volumes 40B and 41A in 1977. Volume 41B for 1975 and Volume 42A for 1976 will be published in 1978. In addition, three cumulative indexes were published in 1976; *Strukturbericht Cumulative Index* (1913–1939); 60-*Year Structure Index* (Part A, *Metals and Inorganic Compounds* 1913–73); 60-*Year Structure Index* (Part B, *Organic and Organometallic Compounds* 1913–73). A supplement to Part A, covering the years 1974 and 1975, was published in 1976 and a similar supplement to Part B was published in 1977.

Volume I of *International Tables for X-ray Crystallography* was reprinted in 1977. Volumes 7, 8 and 9 in the *Molecular Structure and Dimensions* series and a *Guide to the Literature* 1935–76 *Organic and Organometallic Crystal Structures* were also published. The Fifth Edition of the *World Directory of Crystallographers* was published in 1977, and a supplement to the Third Edition of the *Index of Crystallographic Supplies* was published in February 1978 [*J. Appl. Cryst.* (1978), **11**, 65–72].

Commissions of the Union

Each Commission Chairman is required to provide a written triennial report to the General Assembly. These Commission Reports are given as Appendix C.

IMA–IUCr Joint Committee on Nomenclature

The final report of this committee has been published [*Acta Cryst.* (1977), A**33**, 681–684; *Am. Mineral.* (1977), **62**, 411–415]. A report of the work of the committee is given as Appendix E. The Committee has now been dissolved.

Sub-committee on the Union Calendar

The report of this Sub-committee is given as Appendix F.

Union Representatives on other bodies

The reports of the representatives of the Union on other bodies are given as Appendix D.

International Council of Scientific Unions (ICSU)

The Union was represented at the 1975 and 1977 meetings of the ICSU General Committee by Professor Dorothy Hodgkin, and at the 1976 General Assembly and General Committee meeting by Professor B. K. Vainshtein and Dr J. N. King. At these meetings rapporteurs summarized the annual reports submitted by the Unions. At the 1975 meeting some Union representatives reported on a variety of financial and political difficulties experienced in connection with congresses. Whilst some congresses remained large and oversubscribed, others experienced a falling off in numbers and one nearly had to be cancelled because of lack of support. Professor Hodgkin drew attention to the difficulties in raising currency for the registration fees which were sometimes experienced by people wishing to attend a conference.

The General Assembly met in October 1976. Along with other decisions it (1) accepted a report submitted by the *ad hoc* Committee on Recombinant DNA Molecules and resolved to establish a Scientific Committee on Genetic Experimentation to monitor, assist and report on such experimentation, with representation from the interested Unions and Committees; (2) accepted a modified proposal for an International Solar System Decade and authorized the establishment of an appropriate steering committee; (3) passed on to the General Committee and Executive Board a survey *ICSU and the Agricultural Sciences*; (4) invited all members of ICSU to give special consideration to the environmental problems defined in the report *Environmental Issues* 1976, prepared by the Scientific Committee on Problems of the Environment; (5) invited all Unions to make known and follow the suggestions of the Committee on the Free Circulation of Scientists in the brochure *Advice to Organisers of International Scientific Meetings*; (6) recommended that all Unions adhere to the principle of the universality of science and not exclude from membership any community of scientists which effectively represent the scientific activity in a definite territory; (7) expressed its eagerness to welcome into ICSU and the Unions national members (Adhering Bodies) representing the scientific community of the People's Republic of China.

The 1977 meeting of the General Committee agreed to ask National Members to increase their dues by 10% and to invite Unions to consider instituting a $5 tax on participants at Union sponsored conferences. The question of this tax will be considered by the IUCr at the Eleventh General Assembly. The International Federation for Automatic Control was accepted as a Scientific Associate and the National Council for Scientific Research and Development, Malaysia, was accepted as a National Associate. It was proposed that ICSU should undertake a survey of the management of radioactive wastes.

The Union continues to be involved in the work of several ICSU committees. The triennial reports of these representatives on other bodies not belonging to the Union are given as Appendix D.

Resignations and Appointments

Dr S. C. Abrahams was appointed by the Executive Committee to succeed Professor A. J. C. Wilson as Editor of *Acta Crystallographica* from 1 January 1978. Professor Wilson had been Editor of the journal and Chairman of the Commission on Journals since the beginning of 1960. Professor J. Protas and Professor M. M. Woolfson have succeeded Professor J. Wyart and Professor H. Lipson as Co-editors of *Acta Crystallographica*. Professor Wyart had been a Co-editor since the journal was first published in 1948 and Professor Lipson had been a Co-editor since 1956. An appreciation of the long service given by Professors Wilson, Wyart and Lipson has been published in the journal [*Acta Cryst.* (1978), A**34**, 158–159]. Professor A. Guinier, Professor R. Uyeda and Professor E. R. Wölfel retired as

Co-editors of the *Journal of Applied Crystallography* at the end of 1975 and were succeeded by Professor J. C. Joubert and Professor D. Watanabe. Professor K. Molière had to resign as Chairman of the Commission on Electron Diffraction, and the Executive Committee appointed Professor K. Kuchitsu in his place. Professor A. Authier succeeded Professor A. Guinier as Union representative on the ICSU Committee on Science and Technology in Developing Countries. Dr M. Ross and Dr J. J. Papike were appointed Union representative and alternate on the ICSU Co-ordinating Committee on the Moon and Planets. Dr D. T. J. Hurle was appointed by the International Organization for Crystal Growth to succeed Dr C. S. Sahagian as their representative on the Commission on Crystal Growth.

Union Staff

The present staff in Chester is: Dr J. N. King (Executive Secretary), Mrs A. McAll (Secretary); Dr D. W. Penfold (Technical Editor), Dr J. E. Derry (Assistant Technical Editor), Mr M. H. Dacombe and Miss H. Miller (Editorial Assistants) and Mrs J. I. Heywood (Secretary). Mrs S. Wallis has resigned as an Editorial Assistant but it is hoped to appoint her successor in the near future.

Acknowledgements

On behalf of the Union, the Executive Committee wishes to express its deep gratitude to the Polish Academy of Science for the invitation to hold the Eleventh General Assembly and International Congress of Crystallography in Poland. The Executive Committee particularly wishes to express its appreciation to the Chairman of the Organizing Committee, Professor J. Auleytner, and the Chairman of the Programme Committee, Professor K. Łukaszewicz.

The continuing interest and support shown by Unesco, in the form of its annual subvention received by the Union through ICSU, and by ICSU itself is gratefully acknowledged.

In ending this report, the Executive Committee wishes to thank all those crystallographers throughout the world who give so much time and energy to further the work of the Union. Without their help it would not be possible to achieve the results which have been effected. The international contacts formed, often on a personal level, continue to lead to better understanding between crystallographers of different nationalities, and thus constitute a most valuable aspect of the Union's activities.

May 1978.

Appendix B: Financial Report

The accounts of the Union for the calendar years 1975 and 1976 have already been published [*Acta Cryst.* (1976), A**32**, 1019–1033 and (1977), A**33**, 1028–1042]. The accounts for 1977 have been audited and will be published in *Acta Crystallographica*, Section A, later in 1978 [*Acta Cryst.* (1978), 1031–1046].

The accounts for the three years 1975, 1976 and 1977 are summarized in Tables 1–10, in which all the amounts are expressed in US dollars. The balance in each Fund Account at 31 December 1977 is given in Table 12. As a consequence of fluctuations in rates of exchange, a profit or a loss arose each year in terms of US dollars. This profit or loss was divided amongst the Fund Accounts with credit balances, in direct proportion to the balances on these accounts at the end of the year in question. The fluctuations in exchange rates gave rise to losses of $11576 in 1975 and $12631 in 1976, and a profit of $11767 in 1977, leading to an overall loss of $12440 on fluctuations in exchange rates during the triennium. The exchange rates in operation at 1 January 1975 were US $1 = Netherlands guilders 2·60 = Danish kroner 5·80 = £0·431 = Swiss Francs 2·74 = German Marks 2·47. The exchange rates at 31 December 1977 were US $1 = Netherlands guilders 2·40 = Danish kroner 6·10 = £0·55 = Swiss Francs 2·17 = German Marks 2·20.

When the *Acta Crystallographica* accounts (Table 1) are examined, it should be remembered that the full rate annual combined subscription (for both Sections) was Dkr 1400 in 1975, Dkr 1680 in 1976 and Dkr 1860 in 1977. The numbers of pages published in each Section of the Journal were as follows:

	1975	1976	1977
Section A	1218	1038	1046
Section B	2944	3360	3974
Total	4162	4398	5020

Section A included 338 pages of Congress Abstracts in 1975. In an attempt to limit the increase in subscription rates, the Executive Committee restricted the size of the journal and also approved a change of printer and printing methods.

The numbers of paid subscriptions to one or both Sections of the journal were as follows:

	1975	1976	1977
Sections A and B	1730	1643	1561
Section A only	245	205	225
Section B only	153	116	123

Included in these numbers were the following numbers of personal subscriptions at reduced prices:

	1975	1976	1977
Sections A and B	197	178	178
Section A only	55	51	53
Section B only	27	24	23

The increase in the income from sales of back numbers is the result of the decision to increase the price of these volumes to the price of the current volume. Volumes 1–23, the volumes before the journal was divided into two parts, are now sold at the current price of Section A and only as complete volumes. The reduction in the publication costs for 1977 is the result of the transfer from a hot-type method of production to computer-assisted photocomposition. The cost of the technical editing undertaken in Chester is the major part of the editing expenses. These costs are incurred in sterling, but when they are expressed in dollars they do not show an increase proportional to the numbers of pages published because of the fall in the value of sterling with respect to the dollar. These factors have increased the planned excess of income over expenditure, with the result that the balance in the fund account at the end of 1977 was $280118. However, this is still only 59% of the estimated expenditure ($472400) for 1978. Nevertheless, the Executive Committee decided that the subscription rates for 1978 should be increased by only 5%, in an attempt to combat the steady drop

Table 1. *Acta Crystallographica*

Income	1975		1976		1977	
Subscriptions	376,042		436,372		445,606	
Sale of back numbers and single copies	10,984		9,978		15,167	
Sale of Index to Volumes 11–23	6,448		14,282		—	
Airfreight charges to subscribers	8,018		7,898		7,113	
Donation	—		—		100	
Royalties	11		24		19	
	401,503		468,554		468,005	
Less Publisher's commission	39,363	362,140	46,063	422,491	46,077	421,928
Yield from advertisements		556		1,172		602
		362,696		423,663		422,530
Expenditure						
Printing and binding	244,921		303,120		245,101	
Distribution and postage	15,140		14,905		19,749	
Airfreight costs	7,866		8,847		9,976	
Indexes	3,263		3,697		4,503	
Congress Supplement	6,745		—		—	
Printing Index to Volumes 11–23	8,421		—		—	
Printing Index to Volumes 24–28	—		—		11,146	
Editorial expenses	64,886		56,564		68,771	
Administration expenses	6,825	358,067	7,168	394,301	8,100	367,346
Difference between income and expenditure		+$4,629		+$29,362		+$55,184
Profit on fluctuations in rates of exchange		(5,550)		(5,395)		5,210
Accumulated balance at the end of the year		$195,757		$219,724		$280,118

Table 2. *Journal of Applied Crystallography*

Income	1975		1976		1977	
Subscriptions	62,474		67,079		71,134	
Sale of back numbers and single copies	4,862		2,922		2,047	
Airfreight charges to subscribers	1,607		1,547		1,453	
Royalties	3		5		2	
	68,946		71,553		74,636	
Less Publisher's Commission	8,417	60,529	8,750	62,803	9,148	65,488
Yield from advertisements		539		264		566
		61,068		63,067		66,054
Expenditure						
Printing and binding	44,020		37,159		38,308	
Distribution and postage	2,479		2,545		2,673	
Airfreight costs	1,573		1,769		1,995	
Indexes	1,274		—		—	
Congress Supplement	1,481		—		—	
Editorial expenses	13,408		8,560		8,416	
Administration expenses	2,275	66,510	2,389	52,422	2,700	54,092
Difference between income and expenditure		−$5,442		+$10,645		+$11,962
Profit on fluctuations in rates of exchange		(1,035)		(1,130)		1,099
Accumulated balance at the end of the year		$36,497		$46,012		$59,073

in the number of subscribers over recent years. Since the Danish kroner was devalued just after the 1978 subscription rates had been fixed, the increase is only 2% when expressed in dollars.

The *Journal of Applied Crystallography* accounts are given in Table 2. The full subscription was raised in 1975 from Dkr 300, the subscription price for 1973 and 1974, to Dkr 360, to Dkr 380 in 1976 and to Dkr 425 in 1977. The number of paid subscriptions dropped from 1205 in 1975 to 1185 in 1976, and 1169 in 1977. The numbers of pages published were 698 in 1975, 514 in 1976 and 510 in 1977. The larger size in 1975 was the result of publishing many papers and abstracts presented at the International Discussion Meeting on Studies of Lattice Distortions and Local Atomic Arrangements by X-ray, Neutron and Electron Diffraction, which was held at Jülich, 29 April–3 May 1974. The deficit experienced in 1975, because of the increased size of the volume, was recovered in 1976. The fluctuation in the editorial expenses for the three years under review is partly due to the fall in the value of sterling but is also a reflection of the number of pages published, since the expenses of the technical editing office are divided between the two journals in proportion to the numbers of pages published in each journal.

The *Structure Reports* accounts are shown in Table 3. The large income and expenditure in 1975 and 1976 is a reflection of the large number of volumes published in these years, as *Structure Reports* was brought up to date. Volumes 28, 30A–35A and 37A–39A were published in 1975, Volumes 34B, 37B–39B, 40A and the volumes of cumulative indexes were published in 1976, and Volumes 40B and 41A were published in 1977. Because much of the editorial expenses for these volumes had already been paid before 1975 the significant excess of income over expenditure during 1975–1977 represents the recovery of these editorial expenses.

The *International Tables for X-ray Crystallography* accounts are shown in Table 4. The major publishing expenses in 1975 and 1977 were the binding of Volume IV

Table 3. *Structure Reports*

Income	1975		1976		1977	
Sale of copies	202,031		223,807		104,240	
Less Publisher's commission	35,419	166,612	39,233	184,574	18,248	85,992
Expenditure						
Printing and binding new volumes	100,124		85,283		31,994	
Binding additional copies of previous volumes	—		—		2,540	
Typing of manuscripts	5,622		4,625		3,760	
Editorial expenses	44,302	150,048	34,032	123,940	28,864	67,158
Difference between income and expenditure		+$16,564		+$60,634		+$18,834
Profit on fluctuations in rates of exchange		(950)		(2,256)		2,099
Accumulated balance at the end of the year		$33,515		$91,893		$112,826

Table 4. *International Tables for X-ray Crystallography*

Income	1975		1976		1977	
Sale of copies	26,838		15,176		15,394	
Less Publisher's commission	7,226	19,612	5,107	10,069	3,785	11,609
Sale of N.B.S. Monograph		5		5		—
		19,617		10,074		11,609
Expenditure						
Printing and binding Volume IV	2,768		—		—	
Reprinting Volume I	—		—		12,641	
Binding additional copies	1,043		—		2,158	
Art work for volume on direct space	—		—		267	
Editorial expenses	1,312		480		1,551	
Computer Trial Project	16,502	21,625	17,711	18,191	9,032	25,649
Difference between income and expenditure		−$2,008		−$8,117		−$14,040
Profit on fluctuations in rates of exchange		—		—		—
Accumulated Balance at the end of the year		$(29,976)		$(38,093)		$(52,133)

and the reprinting and binding of Volume I respectively. Volume I had to be reprinted because the work on the new volume on direct space had not been completed. This work entailed major expenditure during 1975, 1976 and 1977, mainly represented by the payments to Mr D. S. Fokkema for the computerized generation of the data and the typesetting for this volume. Only part of these expenses was covered by sales of the present volumes and the fund account showed a deficit of $52 133 by the end of 1977. By comparison the account showed a positive balance of $42 106 at the end of 1971.

Table 5 summarizes the accounts for *Fifty Years of X-ray Diffraction*, a few copies of which continue to sell each year. Table 6 shows the accounts for *Symmetry Aspects of M. C. Escher's Periodic Drawings*, which went out of print in 1974 and was reprinted in 1976. Negotiations for the publication of a paperback edition were not successful but a special printing was made for sale in North America by a commercial publisher, at the same time as the original edition was reprinted for sale elsewhere. The Union recovered royalties from the sales of the North American edition and these royalties, based on sales in 1976, yielded $3097 in 1977 and brought the accumulated balance in the fund account to $7476.

The *Early Papers on Diffraction of X-rays by Crystals* accounts are shown in Table 7. Volume I was published in 1969 and Volume II in 1972. Even with the reduction of the prices in 1975, to 70 Netherlands guilders for the set of both volumes, sales have been disappointingly low and at the end of 1977 the fund account still showed a deficit of $8035.

Three more annual volumes in the bibliographic series on organic and organometallic crystal structures, *Molecular*

Table 5. *Fifty Years of X-ray Diffraction*

Income	1975		1976		1977	
Sale of copies	269		103		135	
Less Publisher's commission	47	222	18	85	27	108
Difference between income and expenditure		+$222		+$85		+$108
Profit on fluctuations in rates of exchange		(57)		(50)		41
Accumulated balance at the end of the year		$2,013		$2,048		$2,197

Table 6. *Symmetry Aspects of M. C. Escher's Periodic Drawings*

Income	1975		1976		1977	
Sale of copies	—		2,401		1,455	
Less Publisher's commission	—	—	420	1,981	291	1,164
Royalties		—		—		3,097
		—		1,981		4,261
Expenditure						
Reprinting new edition		—		4,432		—
Difference between income and expenditure		nil		−$2,451		+$4,261
Profit on fluctuations in rates of exchange		(159)		(76)		139
Accumulated balance at the end of the year		$5,603		$3,076		$7,476

Table 7. *Early Papers on Diffraction of X-rays by Crystals*

Income	1975		1976		1977	
Sale of copies	741		274		115	
Less Publisher's commission	130	611	48	226	23	92
Difference between income and expenditure		+$611		+$226		+$92
Profit on fluctuations in rates of exchange		—		—		—
Accumulated balance at the end of the year		$(8,353)		$(8,127)		$(8,035)

Table 8. *Molecular Structures and Dimensions*

Income	1975		1976		1977	
Sale of copies	23,877		20,792		17,159	
Less Publisher's commission	4,178	19,699	3,638	17,154	3,003	14,156
Expenditure						
Printing and binding	5,464		5,323		8,954	
Carriage and miscellaneous expenses	781		463		712	
Salaries	—		—		3,763	
Administration expenses	644	6,889	570	6,356	727	14,156
Difference between income and expenditure		+$12,810		+$10,798		nil
Excess of income over expenditure paid to University of Cambridge		12,169		10,258		nil
Profit on fluctuations in rates of exchange		(88)		(87)		68
Accumulated balance at the end of the year		$3,112		$3,565		$3,633

Structures and Dimensions, were published during the triennium. Because all the editorial costs were paid by the Crystallographic Data Centre, 95% of the excess of income over expenditure was repaid to the University of Cambridge to help offset these costs. In 1977 the Data Centre started to charge for some of these expenses, with the result that the accounts (Table 8) did not show a profit for this year. However, under the terms of the agreement between the Data Centre and the Union, the Union is not required to stand any financial losses which might arise.

Table 9 gives the accounts for the President's Fund, which was suggested by Professor Hodgkin at the Tenth General Assembly in 1975 and was established in 1977. The fund was set up in memory of past Presidents. It is intended for use in emergencies and under special or difficult circumstances, to help crystallographers to take part in the activities of the Union.

Table 10 summarizes the accounts for the General Fund of the Union. This is the fund which is available for the support of scientific activities other than publications. Table 11 compares the fund's accounts for the triennium with the budget approved by the Tenth General Assembly. Table 11 shows a favourable variant of $31978 from the budget. Allowing for the budgeted deficit of $3000, the actual excess of income over expenditure for the General Fund was $28978.

Table 9. *President's Fund*

Income	1975	1976	1977
Donations	—	—	2,496
Difference between income and expenditure	—	—	2,496
Profit on fluctuations in rates of exchange	—	—	47
Accumulated balance at the end of the year	nil	nil	$2,543

The major difference was the yield from investments, which was $21124 more than was budgeted for. Since 80% of the investments currently held by the Union are held in currencies other than US dollars, when the yield from investments is expressed in dollars it is very prone to influence by fluctuations in exchange rates. In the last half of the triennium it has been possible to purchase new investments, to replace the investments which have been redeemed, and to re-establish a more satisfactory reserve against the liabilities of the Union's large publishing commitments. It is the first time that this has been possible for many years. The administration expenses of the Union have increased slightly, although not as rapidly as inflation, and were $13845 less than budgeted for. This reflects partly the continuing fall of sterling and partly the fact that academic salaries in Britain have been subject to a decline in purchasing power. It has proved possible to keep the expenditure on administrative meetings below the expected level, with the result that more money could be used for support of scientific meetings, as the Tenth General Assembly had hoped would be possible ($28563 instead of the budgeted figure of $20000). Although $1750 was spent in support of scientific meetings in 1976, $916 of the money given to the 1975 Prague Summer School on Crystallographic Computing was not utilized and this refund reduced the net expenditure in 1976 to $834. Some members of the Commission on Neutron Diffraction met in 1976, and the Commission on Crystallographic Apparatus met in 1977 with financial assistance from the Union. Other Commissions were able to meet without the need for such financial assistance. Although the Proceedings of the 1974 Conference on Anomalous Scattering sold quite well, the income did not cover the publication costs. Through the concerted efforts of Dr Abrahams and Dr Bednowitz, the publication costs of the Fifth Edition of the *World Directory of Crystallographers* were kept very low. It was possible to sell block-order copies at $2.00 each and still make a small profit.

Tables 12 and 13 give a comparison of the Balance Sheet of the Union at the beginning and the end of the triennium.

Table 10. *General Fund*

Income	1975		1976		1977	
Subscriptions from Adhering Bodies	21,120		29,040		29,040	
Yield from investments and bank accounts	20,823		22,295		32,006	
Grant received from Unesco subvention to ICSU	4,000		5,000		4,000	
Sale of copies of:						
Proceedings of Conference on Anomalous Scattering	2,565		2,457		902	
World Directory of Crystallographers; 5th Edition	—		—		6,969	
Sundry publications	249		78		46	
Donations	77		—		—	
Amount charged to Journals and Publications:						
Acta Crystallographica	6,825		7,168		8,100	
Journal of Applied Crystallography	2,275		2,389		2,700	
Molecular Structures and Dimensions	240	58,174	240	68,667	364	84,127
Expenditure						
Administration	30,147		31,447		35,862	
Subscriptions to ICSU and bodies of ICSU	1,034		1,125		1,325	
Executive Committee Meeting	—		7,220		8,729	
10th General Assembly and Congress:						
Travel grants	6,604		—		—	
Expenses of Commissions	590		—		—	
General Assembly	971		—		—	
Executive Committee	7,926		—		—	
Publication of Report	—		4,423		—	
11th General Assembly and Congress:						
Programme Committee	—		—		8,361	
IUCr Representatives on other bodies – travel expenses	1,068		2,704		1,761	
Expenses of Commissions	174		1,000		3,000	
Sponsorship of meetings	3,500		834		4,500	
Publication of:						
Proceedings of Conference on Anomalous Scattering	8,161		—		—	
World Directory of Crystallographers; 5th Edition	—		—		6,680	
Transfer to President's Fund	—	60,175	—	48,753	303	70,521
Difference between income and expenditure		−$2,001		+$19,914		+$13,606
Profit on fluctuations in rates of exchange		(2,254)		(2,384)		2,097
Accumulated balance at the end of the year		$79,520		$97,050		$112,753

Table 12 shows the fund accounts, whilst Table 13 shows the distribution of the assets. The value of the stocks of unsold copies of the journals and other publications is not included in the assets. The balances in all the accounts, except *International Tables*, have increased since the end of 1974. With the high turnover on publication activities, such an increase is most welcome and provides a more adequate financial backing to these publications. The increasing negative balance in the *International Tables* account gives some cause for concern, but the bulk of the pre-publication work for the new volume on direct space is now completed. In addition, a sizeable donation towards the costs was received early in 1978.

The assets at 31 December 1977, as shown in Table 13, include an amount of $178595 for debtors. The largest part of this relates to amounts due at that date in respect of the publishing operations during 1977, including $89226 from Munksgaard, in connection with *Acta Crystallographica* and the *Journal of Applied Crystallography*, $66834 from Bohn, Scheltema and Holkema, in connection with *Structure Reports* and other publications sold by them, and $7389 from Kynoch Press, in connection with *International Tables*. These amounts, due in 1978, and the great majority of the other amounts under debtors and creditors, have since been settled.

The Union's bank accounts are held with the Union Bank of Switzerland in Geneva, the Amsterdam–Rotterdam Bank N.V. in Groningen, the Citibank in New York, the Handelsbanken in Aarhus and the National Westminster Bank in Manchester and Chester. The investments are government or

Table 11. *Comparison of budget and accounts for the years* 1975–1977 *inclusive*

Income	Budget		Accounts		Difference	
Subscriptions from Adhering Bodies	79,800		79,200		−600	
Yield from investments and banking accounts	54,000		75,124		+21,124	
Subventions from Unesco through ICSU	12,000		13,000		+1,000	
Sale of incidental publications and *World Directory of Crystallographers*	200		13,266		+13,066	
Donations	—	146,000	77	180,667	+77	+34,667
Expenditure						
Administration	81,000		67,155		−13,845	
Subscriptions to ICSU and bodies of ICSU	4,000		3,484		−516	
Scientific meetings	20,000		28,563		+8,563	
Administrative meetings	44,000		34,802		−9,198	
Cost of incidental publications	—		14,841		+14,841	
Transfer to President's Fund	—		303		+303	
Loss on fluctuations in rates of exchange	—	149,000	2,541	151,689	+2,541	+2,689
Favourable variant from budget						$31,978
Less Budgeted deficit						3,000
Excess of income over expenditure						$28,978

Table 12. *Balance Sheet, Fund Accounts*

	31 December 1974	Loss on fluctuations in rates of exchange	31 December 1977
Acta Crystallographica	196,678	(5,735)	280,118
Journal of Applied Crystallography	42,974	(1,066)	59,073
Structure Reports	17,901	(1,107)	112,826
International Tables	(27,968)	—	(52,133)
Fifty Years of X-ray Diffraction	1,848	(66)	2,197
Escher Drawings	5,762	(96)	7,476
Early Papers	(8,964)	—	(8,035)
Molecular Structures and Dimensions	2,559	(107)	3,633
General Publications	53,777	(1,769)	52,008
Total of publication accounts	$284,567	$(9,946)	$457,163
General Fund	83,775	(2,541)	112,753
President's Fund	—	47	2,543
Total accumulated balance	$368,342	$(12,440)	$572,459

government-backed bonds due to mature at various dates until 1993 and with a total maturity value of Swiss Francs 68000, plus Netherlands guilders 237000, plus Deutsch marks 200000, plus US $65000, plus £30000. The largest single holding at 31 December 1977 was of £30000 8¼% UK Treasury Loan 1987/90.

As an association incorporated in Switzerland, the Union is exempt from Swiss Federal and Geneva Cantonal Tax. Under the terms of the United Kingdom/Switzerland Double Taxation Agreement 1967, whilst present circumstances obtain, all income arising within the United Kingdom is not subject to United Kingdom tax.

Appendix C: Reports of the Commissions of the Union

(*a*) *Commission on Journals*

The chief recent technical development has been the transfer from hot-type methods of production to computer-assisted photocomposition for the three journals. Photocomposition of the *Journal of Applied Crystallography* began in the course of 1975, and that of the two sections of *Acta Crystallographica* with the first issues in 1977. At the same time the production of Section B of *Acta Crystallographica* was transferred from Denmark to England, and Section A was transferred in January 1978. The quality of

Table 13. *Balance Sheet, Assets*

	31 December 1974		31 December 1977	
Current assets				
Cash at banks:				
Current Accounts	5,528		56,540	
Deposit and Savings Accounts	29,305	34,833	81,251	137,791
Cash with Union officials		1,202		2,967
Debtors		126,891		178,595
Subscriptions due		825		1,820
		163,751		321,173
Deduct Creditors		59,295		65,370
Net current assets		104,456		255,803
Fixed assets				
Investments at market value	217,319		332,941	
Depreciation/(Appreciation) in value	44,576		(17,746)	
At cost	261,895		315,195	
Office equipment	1,991		1,461	
Total fixed assets		263,886		316,656
		$368,342		$572,459

printing achieved by photocomposition and photolithography is somewhat lower than that achieved by letterpress (hot-type) methods, but the reduction in quality is not obvious to most readers. Through this change in the method of production, coupled with the transfer of the larger journals to a country with a lower cost of living, the increases in subscription prices have been kept more or less in line with inflation, though the volume of material printed has increased considerably. The total number of pages in the three journals, excluding indexes and Congress Abstracts, was 4522 in 1975, and in 1977 it was 5530. Both relatively and absolutely the largest increase has occurred in Section B of *Acta Crystallographica*; the *Journal of Applied Crystallography* in fact, has shown a slight decline. There is no indication that restrictions of university and other research finance have had any impact on the number of papers submitted for publication; this increases by roughly 100 per year.

In spite of the unit-cost reductions achieved by the methods described in the previous paragraph, and the increasing proportion of Short Structural Papers, the increase in subscription rates, and the concomitant reduction in the number of subscribers, is a matter of considerable concern to the Executive Committee and the Commission on Journals. Possible methods of reducing production costs still further, such as the acquisition of an 'in-house' computer or computer-assisted equipment for controlling the photocomposition of the journals, have been suggested. A computer would have other uses for the journals, such as correlating information about papers submitted to different Co-editors, thus eliminating certain problems of duplicate submission of the same structure by different authors, and duplicate submission of the same paper to different Co-editors. Applications to the accounts of the Union and possibly to subscription lists could also be considered.

All editors with eighteen or more years of service resigned from the Editorial Board with effect from 31 December 1977. An appreciation of their services has appeared in *Acta Crystallographica* (1978), A**34**, 158–159. Earlier in the triennium, on 31 December 1975, the first full-time Technical Editor, Mr S. A. Bryant, retired. An appreciation of his services appeared in *Acta Crystallographica* (1976), A**32**, 174.

27 April 1978. A. J. C. WILSON, formerly Chairman
S. C. ABRAHAMS, Chairman
R. A. YOUNG, Co-Chairman

(*b*) *Commission on* Structure Reports

In 1975 fourteen volumes were published; this brought the series effectively up to date, since a lag of at least 18 months seems inevitable between the end of a calendar year and the appearance of the *Structure Reports* volume for that year – to allow for delay in the actual availability of the original journals, preparation of the reports, and publication time. Volume 40A was published in 1976, 40B and 41A in 1977, and 41B and 42A are with the printer and should appear in 1978. Manuscripts for Volumes 42B (*Organic Compounds*, 1976) and 43A (*Metals and Inorganic Compounds*, 1977) are almost complete, so that the volumes should appear in late 1978 or early 1979.

In 1976 three indexes were published: (1) *Strukturbericht Cumulative Index* (1913–1939); (2) 60-*Year Structure Index* (Part A, *Metals and Inorganic Compounds*, 1913–1973); (3) 60-*Year Structure Index* (Part B, *Organic and Organometallic Compounds*, 1913–1973). These indexes, particularly the 60-*Year Structure Indexes*, should make the whole series much more easily accessible. A supplement to the *Structure Index* (Part A, for 1974–1975) was published in 1977 as part of Volume 41A, and a supplement to Part B for 1974–1975 will appear with Volume 41B. The 1961–1970 *Ten-Year Index* (Volume 36) is being compiled.

A report was prepared in July 1977 on the present status of *Structure Reports*. Problems arise chiefly from the increasing number of structures which must be reported, increasing production costs, and consequent decrease in the number of copies sold. The report included various proposals for modifications of editorial, production and sales methods. The consensus of opinion is that efforts should be made to decrease the size (and hence cost) of the volumes by increasing the information density of each page; this should be achieved by relatively minor changes in format, which should not decrease the quality or scientific content of the reports. Distribution of book review copies is under way; hopefully favourable reviews will foster sales (unfavourable reviews will give food for thought).

8 March 1978. J. TROTTER, Chairman

(*c*) *Commission on International Tables*

1. *Present edition*

The present edition of *International Tables* (Volumes I to IV) continues to sell well, as can be seen from Table I. In 1977, a limited third reprint of Volume I was undertaken in order to satisfy the continuing demand.

Table I. *Sales of* International Tables

Volume	I	II	III	IV
Date of publication	1952	1959	1962	1974
Dates of reprinting	1965, 1969, 1977	1967, 1972	1968	—
Number of copies sold up to 31 December 1977	8781	7734	6932	2195
Number of copies sold between 1 January 1975 and 31 December 1977	781	654	652	1811
Stock at 31 December 1977	723	883	624	1818

2. *New Edition of* International Tables

(*a*) During the Tenth International Congress at Amsterdam in 1975 the Commission, in addition to six closed meetings, held an open meeting which was well attended. Six Commission members presented an outline of the content and the computer production of the new volume on direct space. Two Commission meetings were held during the Third European Crystallographic Meeting at Zürich. A small meeting of some Commission members took place at Aachen in December 1977 and a further meeting of this group is scheduled for May 1978, in Aachen.

(*b*) D. S. Fokkema resigned from the employment of the Union in March 1977, but he is still available on a temporary basis until the computer work for the new volume is completed.

(*c*) Throughout the triennium extensive work on the data and the typesetting procedures for the new volume on direct space was undertaken. In May 1976 new phototypesetting tests of computer-produced page examples were completed and in May 1977 a booklet containing computer-produced examples for 23 space groups was issued, as was a complete line-printer output for all 230 space groups. A first round of checking of these data by several Commission members has been completed. Improvements in the layout of the data and extensive additions to the section on sub- and supergroups were prepared in the spring of 1978. A completely new printout is being prepared at present, and this will form the basis for the final checking and proof-reading of all data. At the same time final corrections to the drawings are being carried out. The Introduction to the new volume is being written by a team of authors.

At its meeting in August 1977 the Executive Committee reaffirmed the decision made by the 1951 General Assembly on the two settings in the monoclinic system.

14 April 1978. TH. HAHN, Chairman

(*d*) *Commission on Charge, Spin and Momentum Densities*

At the Tenth General Assembly the Commission was transformed from an *ad interim body* to a fully-fledged Commission of the Union, serving the interests of those who make accurate studies of electron density distributions by means of X-ray and neutron diffraction, Compton scattering, and electron scattering.

The Commission maintains a list of several hundred scientists who are active in these areas, and it has continued to organize the triennial 'Sagamore' conferences which were begun in 1964. These meetings have been instrumental in forging the links between complementary studies of electron charge, spin, and momentum densities, and their organization is a major activity of the Commission members.

In the period 1972–1975 the *ad interim* Commission initiated several projects, some of which came to fruition before the present triennium. Predominantly they involved Compton scattering studies, a rapidly growing area of experimental and theoretical work. All the initial projects have now been completed, and several more have been started. The position is summarized below:

1. *Completed Projects*

(*a*) Standardization of Compton Profile Measurements – The Compton Profile of Water. This project, which was coordinated by Dr B. G. Williams, has been completed and has been reported in detail [*Acta Cryst.* (1976), A**32**, 513–526].

(*b*) Comparison of Experimental Methods for Measuring Electron Momentum Distributions. This project has been completed and the report by Dr W. A. Reed has been published [*Acta Cryst.* (1976), A**32**, 676–690].

(*c*) *Compton Scattering.* This book, edited by Dr B. G. Williams, was published in 1977 by McGraw-Hill; twenty-two authors were involved in its production. It is the only research monograph available on Compton scattering, and it should remain as a standard reference work for many years.

(*d*) Relativistic Compton Profiles. These have now been published in *Atomic and Nuclear Data Tables* (1975), **16**, 202 (F. Biggs, L. B. Mendelsohn and J. B. Mann).

(*e*) Sagamore V. This conference, which was admirably organized by Professor K. V. J. Kurki-Suonio, was held in Finland in August 1976. The conference was attended by 116 participants from 16 different countries. The proceedings have been published [*Phys. Scripta* (1977), **15**, No. 2].

2. *New and Continuing Projects*

(*a*) Accuracy of calculated structure factors and Compton profiles. The aim of this project is to compare and contrast the accuracy of parameters calculated from various types of model in a variety of physical systems (*e.g.* molecules, ionic solid, metal). It has taken time to elicit data from the various groups approached, but it is anticipated that Professor V. H. Smith will present a final report at the Commission's Open Meeting in Warsaw.

(*b*) Oxalic acid project. At a Commission meeting in Finland in 1976 it was decided to initiate a diffraction study of the charge density in α-oxalic acid dihydrate in several laboratories. As most of the potential participants do not have ready access to neutron facilities, the Institut Laue–Langevin and the Brookhaven National Laboratory were approached, and their Directors graciously consented to include the necessary experiments in their neutron diffraction programmes. The parameters will be circulated to participants as soon as they are available. This project is being coordinated by Professor E. N. Maslen.

(*c*) Sagamore VI. This conference will take place 19–25 August 1979 at Mont Tremblant in Canada. The conference chairman is Professor V. H. Smith.

3. *Curtailed projects*

(*a*) The Maine Summer School (1976). Following the success of the Warwick Summer School (1975) the response from American students to this similar venture was disappointing, and it had to be cancelled.

(*b*) The establishment of an absolute scale with silicon single-crystal slices. An investigation made by Dr W. Denne indicated that it was unrealistic to expect useful accuracy from this method in routine laboratory use. Very careful work was a prerequisite. It was therefore thought unwise to offer silicon slices to standard crystallographic users.

In addition to directly sponsored meetings, Commission members have taken active roles in the following international meetings concerned with electron density: Magnetic Structures and Spin Densities, Grenoble, France, 1977; Charge Density in Hydrocarbons, Gordon Conference, USA, 1978; NATO Advanced Study Institute on Charge Density, Arles, France, 1978.

The Commission gratefully acknowledges the Union's sponsorship of the seminar on Electron Density Mapping, held in Rehovot, April 1977, and published in the *Journal of Chemistry* (*Israel*) (1977), Volume 1.6, Nos. 2 and 3. The triennium has seen the completion of several projects, and the initiation of some new ones. This work hopefully consolidates the position of the Commission in the crystallographic community.

4 April 1978. E. F. BERTAUT, Chairman
M. J. COOPER, Secretary

(*e*) *Commission on Crystal Growth*

The Commission was able to meet twice between the Tenth and Eleventh Congresses, the first time in Zürich in September 1976, at the occasion of the First European Crystal Growth Congress, and the second time in Boston, USA, in July 1977, at the occasion of the Fifth International Conference on Crystal Growth.

The Commission is preparing a list of films on crystal growth. The work is progressing slowly but satisfactorily.

The Commission feels that the link between the Union and COSPAR is important and the Union is contributing positively to the role played by the materials science working group of COSPAR. This role should essentially be to set a high scientific standard for the experiments to be performed in space in this field. Dr E. Kaldis has represented the Union at the meetings of COSPAR.

IUPAC and the International Organization for Crystal Growth, together with the Commission, have made some progress with the problems of standardization of nomenclature in the field of crystal growth. However, most members of the Commission feel that IUPAC and the IOCG are better suited to tackle this study. The Commission feels that it is more able to promote research fields which link the IUCr and the IOCG. One example is the relation between structure and morphology. Another is the understanding of the genesis of growth defects and the characterization of these defects. It is with this in mind that the Commission instigated the Summer School on Growth Defects, their Generation and Characterization by X-ray Methods to be held in England in September 1979.

22 March 1978. A. AUTHIER, Chairman

(*f*) *Commission on Crystallographic Apparatus*

The Commission met in Amsterdam, following the close of the Tenth General Assembly and Congress, and again in Oxford, England, on 30 August 1977, prior to the Fourth European Crystallographic Meeting. All remaining matters were dealt with by correspondence. Dr L. D. Jennings (USA), Professor P. Kierkegaard (Sweden), Professor G. Lundgren (Sweden), Professor S. Martinez Carrera (Spain), and Dr S. Szarras (Poland) were appointed consultants to the Commission.

Projects and Publications

1. *Accuracy of Structure Factors from X-ray Powder Intensity Measurements* (P. Suortti and L. D. Jennings)

A critical appraisal of measurement procedures used in accurate powder intensity determination and an analysis of experimental data from a standard nickel sample (including a description of the preparation of this standard) was published [*Acta Cryst.* (1977), A**33**, 1012–1027]. The standard nickel samples can be obtained by contacting Dr Pekka Suortti, Department of Physics, University of Helsinki, Siltavuorenpenger 20 c, SF-00170 Helsinki 17, Finland.

2. *Index of Crystallographic Supplies, Supplement* (R. Rudman)

A supplement to the Third Edition of the *Index* was published [*J. Appl. Cryst.* (1978), **11**, 65–72].

3. *Absolute Intensities in Small-Angle X-ray Scattering* (R. W. Hendricks)

A detailed analysis of data obtained from laboratories in six countries on glassy carbon and polystyrene has been completed. The results will be published in the *Journal of Applied Crystallography* in June 1978 [*J. Appl. Cryst.* (1978), **11**, 196–205].

4. *Accuracy of Intensities Determined Microdensitometrically* (S. Abrahamsson, P. Kierkegaard and G. Lundgren)

A series of carefully prepared precession photographs have been measured microdensitometrically by twelve laboratories in several countries. The data are now being processed and will be analysed in terms of several parameters, including film factors, scale factors and intensity distributions. The final report will be given at the Eleventh Congress. A comparison with diffractometer measurements of the same material will be presented.

5. *Polarization Ratio Survey* (L. D. Jennings)

A survey of the measured polarization ratios of monochromatized X-ray beams is being conducted as part of a broader attempt to focus attention on the necessity of proper measurements of these ratios. An announcement was published [*Acta Cryst.* (1978), A**34**, 159–160].

6. *Radiation Safety Standards* (M. Colapietro)

A survey of recommended radiation safety procedures is continuing, in response to the increasing promulgation of legal standards and regulations in this area. The purpose of this survey is eventually to evolve an internationally accept-

able set of standards which will be compatible with the needs of the researcher.

7. *Radiation Safety Bibliography* (S. Martinez Carrera)

A bibliography of publications dealing with safety shutters and devices, radiation survey techniques and medical aspects of radiation accidents is being prepared. A first draft has been circulated.

8. *X-ray Film Characteristics* (S. Abrahamsson)

Approximately 80 active users of microdensitometers were contacted concerning the initiation of a survey of the response characteristics of currently available X-ray films. Two co-chairmen volunteered, subject to the approval of their Advisory Council. This approval is now pending. The last similar survey was published in *Acta Crystallographica* (1963), **16**, 1107–1119.

9. *Mass Absorption Coefficients* (P. Suortti)

It has been decided to initiate a study of experimental determination of mass absorption coefficients. A chairman and advisory committee are now in the process of being selected.

10. *Crystal Extinction*

A series of papers based on the Open Commission Meeting held at the Tenth Congress (1975) in conjunction with the Commission on Charge, Spin and Momentum Densities was published in *Acta Crystallographica* (1977), A**33**, 232–249.

11. *Computerized Bibliography on Small-Angle Scattering* (R. W. Hendricks)

The possibility of establishing a computer-based bibliography on this subject is being explored.

12. *Congress Exhibitions of Non-Commercial Apparatus and Visual Aspects of Crystallography* (S. Szarras)

Notices concerning these exhibitions have appeared in *Acta Crystallographica* (1977), A**33**, 524–525, and in the Eleventh Congress Circular.

13. *Other Projects*

Several other projects were discussed but no further action has been taken at present:

(*a*) *Experimental Determination of Anomalous Scattering Factors* (S. Hosoya). A survey of experts in the field revealed that the majority thought a comparative project was scientifically feasible. However, there were not enough active participants to present a valid base for comparative measurements.

(*b*) *Standardization of Cable Connecting X-ray Tube to Transformer.* A request was made to consider the formulation of standards for this cable. However, the Commission voted against such a project.

(*c*) *Single-Crystal Radiation Damage Project.* The proposal for research funds described in the previous triennial report of this Commission was turned down. No further action is contemplated by the Commission at this time.

Meetings

1. *Fourth European Crystallographic Meeting*

An Open Commission Meeting was presented at the Fourth European Crystallographic Meeting on 31 August 1977. The talks presented included a preliminary report on the microdensitometry project, a description of current radiation safety standards, a practical primer for powder intensity measurements, and a discussion of current problems in small-angle intensity measurements.

2. *Fourth International Conference on Small-Angle Scattering of X-rays and Neutrons*

The Commission supported this meeting which was organized under the chairmanship of Dr R. W. Hendricks and was held 3–7 October 1977 in Gatlinburg, Tennessee, USA. Over 200 people attended, with 125 papers being presented. The proceedings of the conference will be published in the *Journal of Applied Crystallography*, probably in the October 1978 issue [*J. Appl. Cryst.* (1978), **11**, 295–657].

3. *Open Commission Meetings at the Eleventh Congress*

Two meetings are planned (i) Crystallographic and Diffraction Applications of Synchrotron Radiation. Present Status and Future Trends (R. W. Hendricks and S. Hosoya), and (ii) Microdensitometers (S. Abrahamsson).

4. *Inter-Congress Meeting on Accuracy in Powder Diffraction*

The Commission is supporting a specialist meeting on accuracy in powder diffraction, scheduled to be held at the National Bureau of Standards, Washington DC, USA, 11–15 June 1979.

5 April 1978. R. RUDMAN, Chairman

(*g*) *Commission on Crystallographic Computing*

1. *Far East Winter School*

Following from the decision of the Commission, taken at its 1975 meeting, the main activity has been the organization of a Computing School to be held in the Far East in late 1979 or early 1980. Professor K. Venkatesan was appointed as Chairman of the local organizing committee, and it was decided that the school should be held in early January 1980 at the Indian Institute of Science, in Bangalore. A national organizing committee has been formed, the Chairman and Secretary of the Indian National Committee for Crystallography being included as *ex officio* members. A scientific programme committee has also been appointed. It includes the members of the Commission, Professor C. Singh from Malaysia, Dr Kh. A. I. F. Mannan from Bangladesh, Dr S. S. H. Rizvi from Pakistan, Dr S. Ramaseshan, the present Chairman of the Indian National Committee, and Professor Venkatesan. A first draft of the scientific programme has now been completed, and includes various topics such as Patterson and direct methods, least-squares refinements, fast Fourier transforms, thermal vibrations, electron density measurements, absorption and extinction corrections, software aspects of diffractometry, photographic methods, com-

puter graphics, small computers, conformation of molecules, macromolecular crystallography, programming languages, data base design, automatic crystal analysis, computer hierarchy and microprocessors.

2. *Commission Meeting*

The Commission met at the Fourth European Crystallographic Meeting at Oxford in September 1977, to consider the preparations for the school in India. Not all members could be present but the problems which were discussed had previously been referred to all members for consideration.

3. 1978 *Summer School*

Besides the winter school in India, the Commission decided to hold another computing school, at the Twente University of Technology, as proposed by Dr H. Schenk from Amsterdam. This school is scheduled to take place immediately before the Eleventh Congress. It is organized mainly with the basic idea that there is no possible interference of any kind, particularly financial, with the 1980 winter school which remains the most important project of the Commission. The topics covered by this summer school will include program systems related to structure determination, automatic data collection, and programs on molecular interactions.

4. *Bank of trial structures*

As proposed by Professor M. M. Woolfson, the work on the bank of trial structures for testing direct methods has been undertaken mainly by Dr G. M. Sheldrick. The data will be available shortly.

5. *Comments*

Obviously schools on computing techniques are appropriate to the fundamental needs in many parts of the world. The evolution of computing techniques leads to the necessity to organize and facilitate the transfer of 'know-how', and the Commission should continue to act as a leader in this field, despite various difficulties such as financial support.

12 April 1978. G. BASSI, Chairman

(*h*) *Commission on Crystallographic Data*

At the Tenth Congress the Commission arranged two open sessions with invited speakers on (i) Powder Data, and (ii) Crystallographic Information Services (held jointly with the Commissions on Journals, *Structure Reports, International Tables*, and Computing, and the Working Party on Information Services). Two business meetings were also held and various items on the agenda have been followed up in the ensuing three years.

1. A list of *Recommendations for the Editors of Scientific Journals concerning the Reporting of Crystal Structure Determinations* has been prepared. It has been circulated to all Commission members and extensively edited. The 'final' version is now ready for submission.

2. The need for an *inorganic structural data base*, complementary to the Cambridge organic data base, has been discussed. Further talks took place at the ECM3 in Zürich resulting in a plan to initiate a pilot project shared by three groups – one in Canada and two in the Federal Republic of Germany.

3. The *exchange format FICS–FORM* has been further refined and a proposal has been submitted that, at the Eleventh Congress at Warsaw, a working party should be established to study this problem and to extend the system to cover the exchange of powder data and crystallographic computer programs.

4. At the Amsterdam Congress the Commission was asked to comment on the possibilities of producing a bibliography for mathematical crystallography (compiled by W. Nowacki). After some preliminary assessment of the style of presentation, agreement was reached that the Union would publish this useful compilation. Members of the Commission have agreed to help with the checking of the data.

5. Discussions have been initiated with the editors of *Acta Crystallographica* on the feasibility of computerizing the production of indexes.

For the Eleventh Congress two business sessions are planned and two oral scientific sessions have been arranged with invited papers.

11 April 1978. D. G. WATSON, Chairman

(*i*) *Commission on Crystallographic Nomenclature*

The Commission organized an open meeting during the Tenth Congress in Amsterdam in 1975. The main item was the discussion of the proposal for a crystallographic dictionary. There was a great deal of interest in the subject, but financial problems were, and have remained, insuperable. Other matters discussed were symbols for molecular symmetry.

During the rest of the triennium the Commission has functioned only by correspondence. It participated, through its Chairman, in the work of the IMA–IUCr Joint Committee on Nomenclature. This committee has now presented its report [*Acta Cryst.* (1977), A**33**, 681–684], and has been dissolved. The report has appeared also in the *American Mineralogist* and in *Zapiski Vsesoyuznogo Mineralogicheskogo Obshchestva*.

There will be a considerable change in the composition of the Commission at the time of the Eleventh General Assembly, and it is planned to hold a joint meeting of the outgoing and incoming members on 5 August.

6 April 1978. A. J. C. WILSON, formerly Chairman
S. C. ABRAHAMS, Chairman

(*j*) *Commission on Crystallographic Studies at Controlled Pressures and Temperatures*

A study of the reproducibility of the transition in ZnS from the semiconductor to conductor state which occurs at 150 kbar was planned and carried out. ZnS was chosen because the transition can be observed by several means, including optical and electrical. A single crystal of ZnS was grown, analysed, sectioned, and distributed to 15 laboratories, with results being obtained from 9 laboratories. These included 3 laboratories using the diamond anvil cell and 6 laboratories using various large presses. In conjunction with the Commission on Crystallographic Apparatus, an Inter-Congress meeting on Accuracy in Powder Diffraction is being planned to be held 11–15 June 1979 at the National Bureau of Standards, Washington DC, USA.

10 March 1978. S. BLOCK, Chairman

(*k*) *Commission on Crystallographic Teaching*

This triennium has been a fairly successful one for the Commission and I am delighted to be able to report excellent responses to correspondence from the great majority of members. As a direct result of the discussions held in both open and closed sessions at Amsterdam in 1975, a series of pamphlets on various teaching topics was produced and used as a basis for a summer school held at Erice in September 1977. The school attracted about 90 participants from about 36 different countries and was very successful. During the school a meeting of the Commission was attended by eight of the ten members and two consultants.

The school itself was concerned with the problem of teaching crystallography to non-crystallographers at various levels, with special reference to the problems of developing countries. It is hoped that the pamphlets will form the basis of a project to produce a collection of such pamphlets for the Union, each dealing with a specific topic at a specific level. The continuation of the project will be our main topic of discussion at the Warsaw Congress.

During the triennium the Commission held open sessions at the European Crystallographic Conferences held in Zürich in 1976 and in Oxford in 1977. Both were well attended and the discussions were lively and fruitful. The usual lists of summer schools were produced each year.

24 April 1978. C. A. TAYLOR, Chairman

(*l*) *Commission on Electron Diffraction*

A paper entitled *Guide for the Publication of Experimental Gas-Phase Electron Diffraction Data and Derived Structural Results in the Primary Literature* has been prepared by the Commission members involved in gas electron diffraction, Dr L. S. Bartell, Professor K. Kuchitsu and Dr H. M. Seip, and has been published [*Acta Cryst.* (1976), **A32**, 1013–1018]. It contains general recommendations for the guidance of authors, referees and editors on the reporting of electron diffraction data and derived structures. These recommendations are intended to facilitate reliable evaluation, ease of comparison with other data, and the retrieval of information if later reanalysis becomes desirable in the light of new theories or experiments.

More recently Professor K. W. Hedberg, Professor K. Kuchitsu and Dr H. M. Seip have started a gas electron diffraction service. The first list of 24 typed pages was compiled and distributed by Dr B. Starck in August 1977 to researchers using gas electron diffraction techniques. It gives references on the geometrical structures of 143 free molecules determined by gas electron diffraction and references to 22 other works, based on recent publications from about 20 laboratories. It is intended to continue this project, with lists being distributed about twice a year.

A conference to commemorate the 50th anniversary of the discovery of electron diffraction was held in London, 19–21 September 1977. It was organized by the Institute of Physics, in collaboration with the Royal Microscopical Society and the Chemical Society (Faraday Division), and was sponsored by the Union and the Royal Society. Several Commission members representing high-energy and low-energy electron diffraction took an active part in the planning and in the scientific programme, which gave a good coverage of contemporary topics in these fields of electron diffraction.

Professor K. Molière resigned as Chairman of the Commission in August 1977, and Professor K. Kuchitsu was appointed to take over his position until the Eleventh General Assembly.

25 April 1978. K. KUCHITSU, Chairman

(*m*) *Commission on Neutron Diffraction*

The Commission currently consists of ten members and three consultants. Most of the members and consultants have been active in one of the current projects of the Commission. These include the publication of updated versions of the table of neutron scattering amplitudes and critically evaluated magnetic form factor data, the collection and publication of magnetic structure data, intercomparison of neutron spectrometer performance, intercomparison of thermal parameters obtained by X-ray and neutron diffraction, and the publication of the *Neutron Diffraction Newsletter*.

The editor of the *Newsletter*, Dr B. Klar, left the field of neutron diffraction and resigned as a member of the Commission. He was replaced in April 1977 by Dr W. B. Yelon. The *Newsletter* now appears more frequently and will be the proper forum for communication within the neutron diffraction community. An updated version of the table of neutron scattering amplitudes prepared by Professor G. E. Bacon was published in the May 1977 issue of the *Newsletter*.

The loose leaf binder of *Magnetic Structure Data Sheets* prepared by Dr D. E. Cox has become a very valuable publication for everyone interested in magnetic materials. Several new batches of data sheets have been distributed, making the number of entries so large that provisions are now being made for supplying a second binder. Up to now the publication has been financed through a very modest subscription fee.

As a joint project between the Commission and the Commission on Charge, Spin and Momentum Densities magnetic form factor data have been collected by Dr W. C. Koehler in cooperation with Dr R. M. Moon. Critically evaluated data have been distributed through the *Magnetic Structure Data Sheet* Service.

The Sub-committee on spectrometer intercomparison finished its intercomparison of neutron powder diffraction facilities and a report entitled *An Intercomparison of Neutron Powder Diffraction Instruments* has been published [*J. Appl. Cryst.* (1977), **10**, 497–501]. This investigation was carried out by comparing diagrams obtained on standard Al_2O_3 powder samples, and using flux measurements on irradiated gold foils. Data from 21 instruments in 17 countries are included. Some data have also been collected on single-crystal instruments. Here, however, the individual differences are larger and an intercomparison more difficult.

In connection with the Eleventh Congress, a Conference on Diffraction Profile Analysis and an Open Meeting of the Commission on Neutron Diffraction will be held in Cracow, 14–15 August 1978. The Conference is organized by the Commission in cooperation with the University of Mining and Metallurgy, the Jagellonian University, and the Institute of Physics in Cracow. The first part of the conference will deal with the profile-analysis structure-refinement method as applied both to neutrons and X-rays, and the second part with several items of current interest to neutron diffraction-

ists, such as the X–N technique, neutrons and biology, pulsed neutron sources, monochromators and detectors.

26 April 1978. A. F. ANDRESEN, Chairman

Appendix D: Reports of the Representatives on bodies not belonging to the Union

(*a*) *IUPAP Commission on the Solid State*

The Commission has been active in considering applications for IUPAP sponsorship of conferences but during the past three years it has had increasing difficulty in obtaining approval from the IUPAP Executive Committee for its recommendations.

The 14 conferences approved for sponsorship, including eight with financial support, represent less than half of those recommended by the Commission. To some extent this result reflects the increasing emphasis being placed by the IUPAP Executive Committee on support of large general conferences held every few years, in preference to small specialist conferences. This creates difficulties for the field of solid-state physics, with its very broad range of topics including the associated areas of liquids, polymers, surfaces, *etc.*, for which general international conferences have not been considered possible.

Considerable thought has been given to the structure and function of the Commissions of IUPAP. The relationship of the Solid-State Commission to the Commissions on Semiconductors, Low Temperatures and Magnetism has been discussed. Proposals for some reorganization in this and other areas will be considered at the IUPAP General Assembly to be held in Stockholm in September 1978.

Other topics which have been discussed by the Commission include the improvement of publicity on the activities of IUPAP and its Commissions and improved information exchange regarding the planning of conferences.

6 April 1978. J. M. COWLEY, Representative

(*b*) *Conference Committee of the European Physical Society*

The Committee used to meet twice a year. The main topic of discussion was regularly the sponsorship by the European Physical Society for conferences and meetings of European physicists. Care was taken to ensure a high scientific level of these conferences and the possibility of participation by physicists from all European countries. The representative of the IUCr has tried to eliminate clashes in the dates of meetings organized by physicists and crystallographers on subjects of common interest.

The arrangements for support for members of the European Physical Society participating in conferences are also of importance to the Committee. Statistical material on conferences already held is being collected for the benefit of organizers of future conferences.

27 April 1978. A. LÍNEK, Representative

(*c*) *International Organization for Crystal Growth*

Relations between the International Organization for Crystal Growth (IOCG) and the Union are good. The IOCG nominated Dr C. S. Sahagian as an *ex officio* member of the Union's Commission on Crystal Growth, and he has attended the two inter-Congress meetings of the Commission. He has recently been succeeded by Dr D. T. J. Hurle. It is highly desirable that the procedure to allow the IOCG to become an Associated Organization of the Union should be completed. Joint discussions have taken place on the problem of standardization of nomenclature in the field of crystal growth. Dr R. L. Parker is the IOCG representative in this matter.

22 March 1978. A. AUTHIER, Representative

(*d*) *ICSU Abstracting Board*

The ICSU Abstracting Board has met in the course of each year of the triennium, the 1975 meeting being in Brussels, that for 1976 being in Bethesda (Maryland, USA), and that for 1977, a triennial General Assembly, in York. The first two were associated with symposia, on 'Scientific Engineering Secondary Information Transfer for the Developing Countries', and 'Information Demand and Supply for the 1980s'. The number of members of the Board has increased considerably, but primarily in the category 'Member Services'; response from prospective member unions and member countries has been disappointing. Reflecting this tendency, the General Assembly in York accepted the first fully commercial service into membership, and elected a representative of a Member Service as President for the first time; all previous Presidents have represented either a Member Union or the sponsoring body, ICSU.

The next meetings of the Board will be held in Toulon, France, in July 1978. The associated symposium will be held in Paris during the preceding week.

6 April 1978. A. J. C. WILSON, Representative

(*e*) *ICSU Committee on Data for Science and Technology (CODATA)*

The Fifth International Conference and Tenth General Assembly was held in Boulder, USA, in 1976. Delegates from 13 countries and eight Unions attended the Assembly. During the triennium a number of projects have been completed and others initiated.

The report on the flagging and tagging of data was completed and published as *CODATA Bulletin* 19. This study was a joint project between CODATA and the ICSU Abstracting Board. The updating of the *International Compendium of Numerical Data Projects* has been initiated. Section editors have been appointed for various subject fields and each chapter (subject) is to be published as an issue of the *Bulletin*. The first chapter, on crystallography, appeared as *Bulletin* 24. It covers 16 data centres and 121 publications.

The Task Group on the Accessibility and Dissemination of Data (ADD) published its report on the feasibility of establishing a World Data Referral Centre (WDRC). The proposals were favourably received by Unesco and they have now shared with CODATA the initial expenses for the establishment of such a centre. The WDRC is now operational and is housed in the same building as CODATA and ICSU in Paris. The ADD Task Group, with the assistance of a team of experts in various fields, has prepared a sourcebook on data handling. This covers topics such as the statistical treatment of data, abstracting and indexing services, data

evaluation, standards, and computer handling of data. It is expected that the book will be published later in 1978. The ADD Task Group has also submitted a plan to Unesco on the organization and content of a course suitable for people concerned with the dissemination of numeric data.

The Task Group on Computer Use has recently completed a study on the design of an exchange format for numeric data. This report should be examined by the Union's Commissions on Crystallographic Data and Crystallographic Computing.

11 April 1978. D. G. WATSON, Representative

(f) ICSU CODATA Task Group on Solubility Data

Dr R. A. Laudise has represented the Union on this Task Group of ICSU Committee on Data for Science and Technology since 1973. The original plan was for the Task Group to act in an advisory capacity on the compilation, critical evaluation and publication of solubility data in all physical systems of importance to various areas in science and technology. However, as the result of several difficulties there has been some reorganization. The Task Group has now been terminated and, with it, the Union's involvement in the project. The project has been taken over by the IUPAC Sub-Commission on Solubility Data. The IUCr has offered the Sub-Commission any assistance necessary in the future, should the need arise.

(g) ICSU Committee on the Teaching of Science

During the triennium I attended two full meetings of the Committee (London, May 1976 and Nijmegen, April 1978), three meetings of officers (Paris, May 1975 and May 1977, Washington, October 1976), and three sub-committees in preparation for the Mathematics Seminar. At the last full meeting I was elected Chairman of the Committee.

The principal activities have been:

1. Completion of a series of booklets on various aspects of university teaching under the title *Teaching and Learning Strategies in Higher Education.* The 11 booklets are in the press and should be published by the early summer of 1978.

2. A seminar was held in London in 1976 on the contributions that the various scientific disciplines represented on the Committee might make at school level. A brief report has been published.

3. Preparations for an International Seminar on the relationships between mathematics and the other sciences, which is to be held at Bielefeld in September 1978 in collaboration with the International Commission on Mathematical Instruction.

4. Continuation of support for the International Council of Associations for Science Education, culminating in an International Congress at Nijmegen in April 1978 (Integrated Science Education – World Wide), at which I gave one of the final summary addresses.

5. A joint programme with the ICSU Committee on Science and Technology in Developing Countries led to three regional seminars on environmental education, in Ghana, Malaysia and Latin America.

Among plans for the future are investigations of the problems of training technicians, the production of a newsletter, discussions of possible educational components in the United Nations Conference on Science and Technology in 1979 and preparations for the ICSU General Assembly in September 1978.

24 April 1978. C. A. TAYLOR, Representative

(h) ICSU Committee on Space Research (COSPAR). Working Group on Materials Sciences in Space

The Committee on Space Research (COSPAR) organized a first meeting of an *ad hoc* group on materials sciences in space in 1975 (Varna, Bulgaria), in which the Union was invited to participate. Dr E. Kaldis was sent as the representative of the Union to this and the subsequent meetings. A review of the international activities in this field indicated involvement of more than a hundred groups in academic and industrial research institutions, of both fundamental and applied character. In view of this interest and the new possibilities for research and technology which the flights of the European Spacelab will open in the next decade, it was decided to hold a scientific symposium on this subject at the 1976 COSPAR meeting held at Philadelphia, USA. It was also suggested, depending on the scientific results presented in this symposium, that a working group of COSPAR in this field might be established. In addition to Dr Kaldis, who was also representing the Union at the COSPAR meeting, Dr R. A. Laudise and Dr A. Chernov were appointed by the Union to the programme committee. Dr Kaldis and Dr Laudise attended the symposium, which gave a picture of rather diversified activities in the field. Both theoretical and experimental aspects of this new interdisciplinary field were amply discussed. The symposium showed clearly that many interesting scientific investigations should be carried out, particularly in subjects where the first experiments gave results unexpected by the theory. On the other hand, it became clear that in several cases financial support was given to groups which did not understand basic materials science. It was also disappointing that language difficulties did not permit the full appreciation of the interesting Soviet scientific activities in this field. Many participants of the symposium wished that the Institute of Crystallography of the Academy of Sciences of the USSR, with its famous groups on crystal growth and materials science, could participate more intensively in these meetings.

The participants at the symposium suggested to COSPAR that a working group should be established and 20 members of this group were proposed from among the experts in the field. This proposal was accepted and the Working Group 8 of COSPAR was established. The working group organized scientific sessions at the 1977 COSPAR meeting held in Tel Aviv, Israel, and these sessions contained papers of a high scientific standard. Detailed papers on the Mars mission and the impressive SKYLAB activities showed clearly that the scientific and technological issues in space research are high enough to justify representation in, and even sponsoring of, the materials science field by the Union. At its meeting in July 1977 the Union's Commission on Crystal Growth suggested that the Union should become a permanent member of COSPAR, because of the importance of the materials science in space.

The next meeting of the Working Group 8 will take place in Innsbruck, Austria, in June 1978.

5 May 1978. E. KALDIS, Representative

(i) ICSU Coordinating Committee for the Moon and Planets

This Committee was convened in 1975 by ICSU, with representatives from COSPAR and several international scientific unions, including the IUCr. Its aims were to:

(i) facilitate the co-ordination of interdisciplinary aspects in the field of lunar and planetary research;

(ii) facilitate exchange of information about existing and future lunar and planetary research programmes;

(iii) stimulate compilation and distribution of lunar and planetary data;

(iv) coordinate proposals, made by ICSU bodies, for the organization of international scientific meetings dealing with some aspects of lunar and/or planetary research.

Dr M. Ross was appointed IUCr representative on this Committee and Dr J. J. Papike was appointed IUCr alternate in 1976. The Committee met once in 1976 and twice in 1977. The Chairman of the Committee, Professor S. K. Runcorn, discussed the need for new links to be established between various disciplines in the field of planetary studies. It was also pointed out that many new people were entering these areas of study and that the various unions and organizations they support should be represented in the International Solar System Programme (ISSP). The complex relationships and co-ordination between the many groups, unions and commitees involved with planetary research were also discussed at length. A possible role for the IUCr remains obscure.

2 March 1978. M. Ross, Representative

(j) ICSU Committee on Science and Technology in Developing Countries (COSTED)

Professor A. Authier succeeded Professor A. Guinier as Union representative on this Committee in September 1977. The representatives of the international scientific unions normally take part in the work of COSTED only by correspondence. COSTED has provided financial support to help scientists from developing countries attend scientific meetings or schools, including the Summer School on Teaching Crystallography for Today's Sciences, held in Erice, Italy, in September 1977 and the Eleventh Congress in Warsaw. It is also hoped that COSTED will be able to provide some travel fellowships for the 1980 School on Crystallographic Computing, to be held in Bangalore, India. However, problems have been experienced because COSTED considers that meetings on crystallography, except for those concerned with teaching, do not necessarily fit into the objectives of COSTED, since the subjects are not ones which help development in these countries in a direct way.

Details of the Travel Fellowships offered by COSTED may be obtained from the Scientific Secretary, COSTED Secretariat, Indian Institute of Science, Bangalore 560012, India.

Appendix E: Report of the IMA–IUCr Joint Committee on Nomenclature

The Joint Committee was set up by the International Mineralogical Association and the International Union of Crystallography in 1970 to consider nomenclature problems that were common to the disciplines of mineralogy and crystallography. In particular, the Committee was asked to consider problems resulting from the phenomenon of polytypism in layered structures and to recommend a system of notation for polytypic structures. In addition, solicitation of other problems was made through both organizations and by each committee member in his own country.

The final report has been prepared, approved by both the IMA and the IUCr, and published [*Acta Cryst.* (1977), A**33**, 681–684 and *Am. Mineral.* (1977), **62**, 411–415; it has also been published in *Bull. Soc. fr. Minéral. Cristallogr., Canad. Mineral.* and *Zap. Vses. Mineral. Ova. SSSR*]. The nomenclature recommendations given in the report included definitions of polytypism, topotaxy, syntaxy, and epitaxy, certain criteria for mineral names, preferred format for chemical formulae, and preferred symbols for crystallographic axes and repeat distances. Two recommended systems of structural symbols to be used to differentiate polytypes were presented.

Appendix F: Summary of the activities of the Sub-committee on the Union Calendar

This Sub-committee is a sub-committee of the Executive Committee and therefore, according to Statute 8.1, has no obligation to report to the General Assembly. However, a summary of its activities is given in this Appendix for the information of delegates.

During the period since the Tenth General Assembly, the Sub-committee has considered many requests for sponsorship and financial support by the Union, and has made recommendations accordingly to the Executive Committee. The following meetings on topics of crystallographic significance have received Union sponsorship. Meetings which also received financial support from the Union are indicated by an asterisk. The list includes meetings held after the Tenth General Assembly but which were awarded Union sponsorship by the Executive Committee before the end of that General Assembly.

Third International Conference on Vapour Growth and Epitaxy, Amsterdam, The Netherlands, 18–21 August 1975.

*Summer School on X-ray Dynamical Theory and Topography, Limoges, France, 18–26 August 1975.

Course on Crystal Growth, Erice, Sicily, Italy, 30 August–7 September 1975.

Third European Meeting on Ferroelectricity, Zürich, Switzerland, 22–26 September 1975.

COSPAR Symposium on Materials Science in Space, Philadelphia, USA, 9–10 June 1976.

Symposium on Direct Methods, Buffalo, USA, 3–6 August 1976.

*Sagamore V, Kiljava, Finland, 16–20 August 1976.

Second Europhysical Conference on Lattice Defects in Ionic Crystals, Berlin, Federal Republic of Germany, 30 August–3 September 1976.

Third European Crystallographic Meeting, Zürich, Switzerland, 6–10 September 1976.

*Fifth IberAmerican Congress of Crystallography, Madrid, Spain, 10–17 December 1976.

*Bat-Sheva Seminar on Electron Density Mapping in Molecules and Crystals, Rehovot, Israel, 18–28 April 1977.

*Third International Summer School on Crystal Growth, University of New Hampshire, USA, 10–15 July 1977.
Fifth International Conference on Crystal Growth, Boston, USA, 17–22 July 1977.
Fourth European Crystallographic Meeting, Oxford, UK, 30 August–3 September 1977.
*Summer School on Teaching Crystallography for Today's Sciences, Erice, Italy, 5–15 September 1977.
*Fourth International Conference on Ferroelectricity, Leningrad, USSR, 18–23 September 1977.
*International Conference to mark the 50th Anniversary of the Discovery of Electron Diffraction, London, UK, 19–23 September 1977.
*Fourth International Conference on Small-Angle Scattering, Gatlinburg, USA, 3–7 October 1977.
*International Symposium on Biomolecular Structure, Conformation, Function and Evolution, Madras, India, 4–7 January 1978.
Fifth International Symposium on the Organic Solid State, Waltham, Mass., USA, 13–16 June 1978.
Fourth International Conference on Vapour Growth and Epitaxy, Nagoya, Japan, 9–13 July 1978.
*International Summer School on Crystallographic Computing, Twente, The Netherlands, 24 July–1 August 1978.
*Summer School on Diffraction Studies of Non-Crystalline Substances, Pécs, Hungary, 14–18 August 1978.
*Conference on Diffraction Line Profile Analysis, Cracow, Poland, 14–15 August 1978.
Sixth International Symposium on Boron and Borides, Druzhba, Bulgaria, 9–12 October 1978.
Inter-Congress Symposium on Accuracy in Powder Diffraction, Washington DC, USA, 11–15 June 1979.
Fifth European Crystallographic Meeting, Copenhagen, Denmark, 13–17 August 1979.
Sagamore VI Conference on Charge, Spin and Momentum Densities, Mont Tremblant, Canada, 19–25 August 1979.
*School on Crystallographic Computing, Bangalore, India, January 1980.

A list of meetings of interest to crystallographers is published in each issue of the *Journal of Applied Crystallography*. Attempts to make this list as comprehensive as possible depend to a large extent on the Executive Secretary being informed of relevant meetings by National Committees and individual crystallographers.

Appendix G: Budget estimates for the period until the Twelfth General Assembly; determination of the unit contribution

(*a*) *Budget estimates*

As previously, an estimated budget for the period until the next General Assembly has been prepared for the General Fund only. Since the budget estimates had to be prepared at a time when the decisions on many activities had still to be made, these estimates should be considered with due reserve. With this proviso, and in accordance with Statute 9·3, the Executive Committee presents to the Eleventh General Assembly the estimates for the three-year period 1 January 1978–31 December 1980 (Table I).

It has only been in the last two years that it has been possible to replace the bonds which have been redeemed over recent years with new investments. This has had the immediate effect of increasing the annual yield from investments, so that this yield approximately balances that part of the administrative expenses which is charged to the General Fund. The income from subscriptions from Adhering Bodies has been determined on the basis of unit contributions of $220 for 1978 and $300 for 1979 and 1980. As in the past, the above budget assumed that part of the expenses of the administration ($40 600) will be charged to the publication accounts. Thus the total expenses of administration are estimated at $132 800.

Table I. *Estimates for the three-year period* 1 *January* 1978–31 *December* 1980

Income	$	
Subscriptions from Adhering Bodies	109,060	
Yield from investments and banking accounts	92,000	
Subventions from Unesco through ICSU	18,000	
Sale of incidental publications	8,640	
		$227,700
Expenditure		
Administration	92,200	
Subscriptions to ICSU and bodies of ICSU	5,500	
Administrative Meetings	52,000	
Scientific Meetings	64,000	
Cost of incidental publications	10,200	
		$223,900
Estimated profit		+$3,800

Expenses included under 'Administrative Meetings' are those of the Executive Committee meetings, Union representation on other bodies and the printing of the report of the General Assembly. The heading 'Scientific Meetings' includes financial support for scientific meetings organized or sponsored by the Union as well as the expenses of the non-publishing Commissions, the Commission Chairmen and the Scientific Programme Committee for the triennial Congresses of Crystallography. The expenses of the publishing Commissions are charged to the relevant publication.

The Executive Committee is conscious of the need to keep expenses, particularly administrative expenses, to a minimum. However, the Executive Committee is required to meet at least twice during the period between the General Assemblies (By-Law 2·1), and it is felt that these annual meetings are necessary if the Committee is to maintain an effective control over the financial affairs of the Union, particularly with regard to the very large publishing activities which currently involve an annual turnover of over $600 000.

The steady increase in the size of the journals has necessitated larger offices being acquired in Chester and the Union Secretariat and technical editing office will be moving from their present location to 5 Abbey Square, Chester, in the summer of 1978. The rent for the new accommodation in Chester will remain very low by comparison with that in other Western European countries and salaries in Britain continue to be amongst the lowest in Western Europe.

(*b*) *Unit contribution*

According to Statute 5·10(*k*) the General Assembly has to determine the unit contribution from the Adhering Bodies for the period to the next General Assembly.

The Executive Committee considers it necessary to recom-

mend an increase in the unit contribution to $300 from 1 January 1979. National Committees were first advised of the Executive Committee's intention in November 1976 and January 1977, and again in January 1978.

The last time that the unit contribution was increased was at the General Assembly in 1975, when it was raised from $160 to $220 for 1976, 1977 and 1978. In view of the substantial increases in costs in the last three years, the effective devaluation of the US dollar and the wish to increase financial support to scientific meetings and Commissions, the Executive Committee proposes, on the basis of the budget given in Section (*a*) above, that the unit contribution be increased from 1 January 1979 to US $300 for the years 1979, 1980 and 1981. The proposal to keep the unit contribution constant for these three years is made in the light of the feelings of delegates expressed at the last two General Assemblies, when they preferred this arrangement to the idea of smaller annual increases.

The above proposal is made on the basis of exchange rates in force on 12 August 1977 (US $1 = Swiss Francs 2·39 = UK £0·575 = Netherlands guilders 2·42 = German Marks 2·27 = Danish kroner 5·90). Should significant alterations to exchange rates occur before the General Assembly, the Executive Committee may consider it necessary to make supplementary proposals or to designate the unit contribution in terms of another currency (Statute 9·5).

ANNEX II

Statutes and By-Laws of the International Union of Crystallography

as Adopted by the Fourth General Assembly in 1957 and Amended by the Fifth General Assembly in 1960, the Sixth General Assembly in 1963, the Seventh General Assembly in 1966, the Eighth General Assembly in 1969, the Ninth General Assembly in 1972, the Tenth General Assembly in 1975, and the Eleventh General Assembly in 1978

Statutes

1. Objects of the Union

1·1. The objects of the Union are

(*a*) to promote international cooperation in crystallography;

(*b*) to contribute to the advancement of crystallography in all its aspects, including related topics concerning the non-crystalline states;

(*c*) to facilitate international standardization of methods, of units, of nomenclature and of symbols used in crystallography;

(*d*) to form a focus for the relations of crystallography to other sciences.

1·2. For these purposes the Union shall have the power

(*a*) to adhere to the International Council of Scientific Unions;

(*b*) to organize international meetings and conferences on subjects falling within the purview of the Union;

(*c*) to promote international publication of crystallographic research and of crystallographic works;

(*d*) to set up Commissions or other bodies for special objects;

(*e*) to initiate, promote and coordinate crystallographic research requiring international cooperation;

(*f*) to organize Special Projects which shall be financed independently of the regular operations of the Union;

(*g*) to participate in Joint Commissions with other Unions or other scientific bodies in matters of interest to the Union;

(*h*) to perform all such other legal acts as are essential for or conducive to the objects of the Union including the constitution or organization of separate or independent bodies having an appropriate legal status;

(*i*) to receive into association existing regional organizations of crystallographers having substantially the same aims and objects as the Union; these organizations shall be known as Regional Associates of the Union;

(*j*) to receive into association existing international scientific organizations whose interests overlap with the aims and activities of the Union; these organizations shall be known as Scientific Associates of the Union.

2. Organization and Legal Domicile

2·1. Under the name of International Union of Crystallography an Association has been organized and incorporated; it is governed by Articles 60 and following of the Swiss Civil Code and by the present Statutes of Incorporation.

2·2. The duration of the Union is not limited.

2·3. The legal domicile of the Union is in Geneva, Switzerland.

3. Membership

3·1. The members of the Union are its Adhering Bodies.

3·2. There shall be only one member for each Country.

3·3. In a Country the Adhering Body can be a National Academy, National Research Council or similar body, or a scientific society or group of such societies. Each Adhering Body shall form a National Committee for Crystallography to represent it in the Union.

3·4. Any number of Countries may agree to form a group in order to name or establish a single Adhering Body. This Body shall form a joint National or Regional Committee for Crystallography. Wherever the terms Country and National Committee for Crystallography are used in these Statutes or in the By-Laws, they shall be taken to include such groups of Countries and joint National or Regional Committees for Crystallography.

3·5. Membership in the Union shall be fully effective when the nature of the Adhering Body and the membership of the National Committee have been reported to and accepted by the General Assembly. Any replacement of an Adhering Body is subject to the approval of the Executive Committee and acceptance by the General Assembly. Any major change in the nature of an Adhering Body shall be considered valid only after it has been reported to and accepted by the General Assembly.

3·6. Adherence to the Union shall be in one of five Categories I–V with corresponding voting powers and contributions as set out in Statutes 5·5 and 9·4. A Body applying for adherence to the Union shall specify in which Category it wishes to adhere; this choice of Category, or any desired change in the Category, is subject to the approval of the Executive Committee and confirmation by the General Assembly.

3·7. Any extension of a joint adherence formed in accordance with Statute 3·4 is subject to the approval of the Executive Committee and acceptance by the General Assembly.

3·8. Participation in Special Projects [Statute 1·2(*f*)] shall not be obligatory. The extent of financial participation shall be a matter for special negotiation for each such project, except that the relationship between contribution and voting power within the project shall be that of the Category scheme defined in Statutes 5·5 and 9·4 to determine this relationship in the General Assembly.

3·9. Each National Committee has the right to submit to the Union through the General Secretary questions within the competence of the Union.

3·10. Any Adhering Body may withdraw from the Union if it has given notice of withdrawal at least six months before the end of the current financial year; it is required to fulfil its obligations relating to the time period when it was a member of the Union. Its membership and any further obligations shall then be suspended by the Executive Committee at the expiry of the notice of withdrawal. The withdrawal shall take effect when it has been reported to the General Assembly.

3·11. An Adhering Body which withdraws from the Union in accordance with Statute 3·10, or any Adhering Body whose membership is cancelled in accordance with Statutes 5·12 or 9·6, loses all rights in connexion with the Union.

3·12. If the Countries of a group formed in accordance with Statute 3·4 agree that the group should be dissolved, or if a Country wishes to withdraw from such a group, with or without the agreement of the other Country or Countries of the group, the adherence of the original group shall be suspended by the Executive Committee at the expiry of an appropriate notice, provided that the original group has fulfilled its obligations. The termination of the original adherence shall take effect when the matter has been reported to the General Assembly. Pending this report, the Countries of the group, or any of them, may submit proposals for the continuation of their representation in the Union. In each of such proposals the nature of the Adhering Body, the membership of the National Committee and the desired Category of adherence shall be specified. These proposals are subject to the approval of the Executive Committee, which shall then make *ad interim* arrangements concerning these adherences. These arrangements are subject to acceptance by the General Assembly.

4. Administration

4·1. The work of the Union shall be conducted by

(*a*) the General Assembly;

(*b*) the Officers of the Union, constituting the Executive Committee;

(*c*) the Commissions as defined in Statute 8·1.

The composition and function of these bodies are defined in the following paragraphs, whose application is governed by the By-Laws.

5. General Assembly

5·1. The work of the Union shall be directed by the General Assembly which is composed of delegates appointed by the Adhering Bodies.

5·2. The Executive Committee is responsible to the General Assembly and shall participate in its deliberations. Members of the Executive Committee have no voting power in the General Assembly, except for the casting vote of the Chairman [Statute 5·8].

5·3. The General Assembly shall, as a rule, hold an ordinary meeting once every three years. The date and the place of the meeting, unless determined by the previous General Assembly, shall be determined by the Executive Committee. The General Secretary shall communicate the date and the place of the meeting to the National Committees and to the Commissions at least twelve months in advance.

5·4. In special cases, the President of the Union, with the consent of the Executive Committee, may call an extraordinary meeting of the General Assembly. He shall do so at the request of one-fifth of the Adhering Bodies. The routine business of a General Assembly prescribed in Statute 5·10 shall normally be omitted, unless specifically included in the agenda; but an extraordinary General Assembly shall have the same powers, and be subject to the same rules, as an ordinary General Assembly, except where otherwise is stated in the Statutes and By-Laws. The General Secretary shall communicate the date and the place of the extraordinary General Assembly to the National Committees and to the Commissions at least eight months in advance if amendment of the Statutes is contemplated, or at least four months otherwise.

5·5. The voting power of an Adhering Body at General Assemblies shall be in accordance with its Category of adherence, as follows

Category	I	II	III	IV	V
Number of votes	1	2	3	4	5

5·6. Each Adhering Body, through its National Committee, shall make known to the General Secretary before the opening of each General Assembly the names of its delegates (and of their alternates, if any), and also the name of the chairman of the national or regional delegation. No Officer of the Union may be a member of any delegation, nor shall any person serve as a member of more than one delegation.

5·7. Normally each of the delegates present at a General Assembly shall have one vote only, but when for special reasons an Adhering Body cannot be fully represented at a General Assembly it may distribute its votes among a number of delegates smaller than the number of votes which that Adhering Body has in accordance with the Category in which it adheres; such a decision has to be made known to the General Secretary before the opening of the General Assembly concerned. Any Adhering Body not represented at a General Assembly may forward its views to the General Secretary by letter, and such views shall be made known to the General Assembly if received before voting takes place.

5·8. Except where otherwise provided in the Statutes and By-Laws, decisions of the General Assembly are taken by a majority of the votes cast. In the event of an equal division of votes the Chairman shall take the final decision.

5·9. No question which has not been placed on the agenda of business to be transacted at the General Assembly shall be discussed or put to the vote unless a proposal to that effect be approved by at least two-thirds of the votes there represented.

5·10. The General Assembly shall

(*a*) take appropriate action on any matters concerning membership in the Union [Statues 3·5, 3·6, 3·7, 3·10, 3·12 and 5·12];

(*b*) elect the President, the Vice-President, the General Secretary, the Treasurer and the other Officers of the Union [Statutes 6·1 and 6·3];

(*c*) consider, and make decisions regarding, the confirmation of the appointments of Editors of publications of the Union [Statute 7·1];

(*d*) determine the number of elected members of each Commission set up by the General Assembly [Statutes 5·11(*c*) and 8·2];

(*e*) elect the Chairmen and members of the Commissions [Statute 8·2];
(*f*) elect representatives of the Union on Joint Commissions with other Unions, and on other scientific bodies [Statutes 1·2(*g*) and 8·5];
(*g*) receive the reports on the activities of the Union and of its Commissions [Statutes 6·8 and 8·4];
(*h*) receive the audited accounts for the years elapsed since the previous General Assembly [Statute 9·1];
(*i*) on receipt of satisfactory reports or accounts, release the Treasurer, or any other Officer, or the Chairman or any member of any Commission or other body, from financial or other liability to the Union;
(*j*) determine the budget for general expenditure for the period to the next General Assembly, on the basis of the estimate prepared by the Executive Committee [Statutes 9·2 and 9·3];
(*k*) determine the unit contribution for the period to the next General Assembly [Statute 9·5];
(*l*) determine the general policy and the timetable for the period to the next General Assembly;
(*m*) give preliminary consideration to the activities of the Union for the three-year period following the next General Assembly.

5·11. The General Assembly shall have the power
(*a*) to amend these Statutes in accordance with Statute 13·1;
(*b*) to formulate and amend By-Laws on any matters not covered by these Statutes;
(*c*) to set up any Commission or other body it may deem necessary for the administrative and scientific work of the Union, and to determine the terms of reference of such body [Statute 1·2(*d*)];
(*d*) to dissolve any Commission or other body set up in accordance with Statute 5·11(*c*) when its existence is deemed no longer necessary;
(*e*) to determine the nature of Special Projects which shall be financed independently of the regular operations of the Union [Statute 1·2(*f*)];
(*f*) to accept Regional Associates, to determine the nature of the association in each case, and to determine any mutual financial commitments;
(*g*) to accept Scientific Associates, to determine the nature of the association in each case, and to determine any mutual financial commitments;
(*h*) to decide on all other questions falling within the competence of the Union.

5·12. The General Assembly may cancel the membership of any Adhering Body of the Union for any serious cause; such a decision may only be taken after the member in question has been previously given an opportunity to furnish an explanation to the Executive Committee for forwarding to the General Assembly. At least three-fourths of the total number of the votes of all Adhering Bodies are required for cancellation.

6. Executive Committee

6·1. The officers of the Union constituting the Executive Committee are
(*a*) the President;
(*b*) the Vice-President;
(*c*) the General Secretary;
(*d*) the Treasurer;
(*e*) the immediate Past President;
(*f*) six ordinary members.

6·2. The election of Officers of the Union shall be arranged in such a way that there will not be more than two Officers from any one Country. A person is regarded as belonging to the Country in which he is normally resident and where he conducts the main part of his work. In cases of doubt the General Assembly shall decide to which Country a person is considered to belong.

If during the period between General Assemblies the number of Officers from a Country is increased above two because of any change of Country of residence, the Officer or Officers who changed his or their Country of residence may continue his or their service until the close of the next General Assembly. If at that time the number of Officers from the Country concerned would remain above two, one or more of the Officers who changed his or their Country of residence shall be considered to have resigned.

6·3. The offices of General Secretary and Treasurer may be combined and shall then be considered as a single office. Otherwise no person shall hold more than one office simultaneously. The voting power of the Officer holding the combined office of General Secretary and Treasurer shall not be more than that of either the General Secretary or the Treasurer.

6·4. The President holds office as President until the close of the ordinary General Assembly following his election, and continues as a member of the Executive Committee until the close of the ordinary General Assembly next but one following that of his election. He is not then eligible for immediate re-election to the office of President, nor to any other office in the Executive Committee.

The Vice-President holds office until the close of the ordinary General Assembly following his election. He is not eligible for immediate re-election to the same office.

The General Secretary and the Treasurer hold office until the close of the ordinary General Assembly following that of their election. They are eligible for immediate re-election to the same office, but shall not serve in that office for more than three full consecutive terms.

Three ordinary members are elected at each ordinary General Assembly and hold office until the close of the ordinary General Assembly next but one following that of their election. They are not eligible for immediate re-election to the same office.

In the event of a vacancy, through resignation, death or other cause, any Officer elected by the General Assembly to fill the unexpired term of office shall serve only to the end of the normal term of the Officer he replaces; at the end of this service he may be nominated for re-election for a full term to the same office.

6·5. The Executive Committee shall carry out the decisions of the General Assembly and give effect to the general policy of the Union as determined by the General Assembly.

6·6. During the periods between General Assemblies the Executive Committee shall have full power to carry on the business of the Union in all matters not specifically assigned by the Statutes, the By-Laws or the General Assembly to individuals or to Commissions or other bodies. If necessary, it may make *ad interim* arrangements in all matters assigned by the Statutes and By-Laws to the General Assembly.

6·7. In the event of an individual, a Commission or another body of the Union failing to act in any matter as-

signed to him or it by the Statutes, By-Laws or the General Assembly, the Executive Committee may, after reasonable notice to the individual or body in question, take action on behalf of the Union.

6·8. The Executive Committee shall report on its activities to the General Assembly. The action taken by the Executive Committee in accordance with Statutes 3·5, 3·6, 3·7, 3·10, 3·12, 6·6, 6·7, 7·1, 7·2, 8·2, 9·6 and 9·9 shall be included in this report. The report to the General Assembly shall be dispatched by the General Secretary to the National Committees and to the Commissions at least ten weeks before the meeting.

7. Publications of the Union

7·1. The Editors of the publications of the Union are appointed by the Executive Committee for initial terms extending through not more than six years beyond the ordinary General Assembly following the appointment. Each initial appointment is subject to confirmation by that General Assembly. Reappointments may be made by the Executive Committee for terms of not more than three years, and are subject to confirmation by the ordinary General Assembly following the reappointment.

7·2. Co-editors and Assistant Editors are appointed by the Editors for terms of not more than three years, but they may be reappointed immediately for terms of the same length. The appointments and reappointments are subject to the approval of the Executive Committee.

7·3. Editors and Co-editors are members of the Commissions set up for their respective publications.

8. Commissions and Joint Commissions

8·1. The term 'Commission' shall be understood to include all Commissions, Committees, and other bodies of the Union with the exception of National Committees for Crystallography, and the Executive Committee and its subcommittees.

8·2. The Chairmen and members of the Commissions are elected at each General Assembly. Subject to the approval of the Executive Committee, Commissions may co-opt further members during the periods between General Assemblies, and may fill vacancies arising from resignation, death or other cause. Members (but not Chairmen) may be nationals of or residents in a Country not adhering to the Union.

8·3. The Commissions shall be responsible to the General Assembly. They shall generally have full freedom in arranging their internal structure and work. They may formulate their own Rules of Procedure within the framework of the Statutes and By-Laws of the Union, and within their terms of reference.

8·4. The Chairmen shall report on the activities of the Commissions to the General Assembly. These reports shall reach the General Secretary at least fourteen weeks before the General Assembly and shall be dispatched by him to the National Committees and the Commissions at least ten weeks before the meeting.

8·5. The representatives of the Union on Joint Commissions and on other scientific bodies [Statute 1·2(*g*)] are elected at each General Assembly. For each such body one representative shall be designated as the chief representative of the Union. His obligations to report are the same as those of the Chairmen of the Commissions.

9. Finance

9·1. The Executive Committee shall be responsible to the General Assembly for all the financial affairs of the Union.

9·2. The Chairman of each Commission (or other member approved by the Executive Committee) shall be responsible to the Executive Committee for any expenditure of funds by his Commission. Five months before each General Assembly he shall submit to the Executive Committee an estimate of the budget of his Commission for the period between that General Assembly and the one following it. He shall submit annually to the Executive Committee a revised budget for the ensuing year and a statement of accounts for the preceding year. His accounts shall be available for audit by the Executive Committee or its appointees.

9·3. The Executive Committee shall prepare an estimate of the budget for the period between the next General Assembly and that following it. This estimate shall be dispatched by the General Secretary to the National Committees and to the Commissions at least ten weeks before the meeting.

9·4. Each Adhering Body shall pay an annual subscription in accordance with its Category of adherence, as follows

Category	I	II	III	IV	V
Number of unit contributions	1	3	6	10	15

The annual subscriptions are payable during the calendar year to which they apply.

9·5. The unit contribution, stated in terms of a currency to be designated by the Executive Committee, shall be determined by the General Assembly for the period to the next General Assembly.

9·6. Any Adhering Body which is in arrears with its subscription for two years shall be warned and shall be deprived of its voting power. The membership of any Adhering Body which is in arrears for four years shall be automatically suspended and may be cancelled by the General Assembly under Statute 5·12. An Adhering Body whose membership has been suspended shall receive no privileges of the Union and incur no further responsibility for dues; it may be reinstated by action of the Executive Committee.

9·7. The financing and management of publications of the Union shall be kept distinct from general expenditure. Editors and Co-editors shall be responsible to the Executive Committee for any receipts or expenditure of funds by them with respect to their publications.

9·8. The financing and management of Special Projects of the Union shall be kept distinct from the regular operations of the Union.

9·9. No funds may be solicited or accepted on behalf of the Union or any of its Commissions from any international, governmental or other agency or person without the prior approval of the Executive Committee. Any National Committee for Crystallography may however solicit funds within its own Country for the support of its own activities or in its capacity as host for a General Assembly, Congress or other meeting sponsored by the Union. Any funds in the form of donations, legacies, or grants, accepted by the Executive Committee shall be used so far as is possible in accordance with the wishes of the donors.

10. Liability

10·1. The Union is liable only to the extent of its assets, and the Adhering Bodies are not individually liable for its corporate debts and liabilities.

10·2. The liabilities of the Adhering Bodies are limited to the payment of their annual subscriptions and to such contributions to the Special Projects of the Union as they may have pledged.

10·3. No Officer of the Union shall be individually liable for the corporate debts and liabilities of the Union. The Union shall indemnify any Officer or former Officer in respect of any claims laid against him in respect to his authorized actions on behalf of the Union. At its discretion the Executive Committee may extend this indemnity to other persons in respect of their authorized actions on behalf of the Union.

10·4. The Union shall not accept any liability for any personal loss, damage or accident sustained by an individual, not being an employee of the Union, engaged in any activity, including travel, on behalf of the Union.

11. Auditor and Representation of the Union

11·1. The Auditor of the Union shall be a person or corporation authorized to act as a public accountant. The Auditor shall be appointed by the Executive Committee on the recommendation of the Treasurer and maintained thereafter subject to the approval of the General Assembly.

11·2. With the exception of cheques, all contracts and formal agreements involving the Union shall be signed by two Officers of the Union. The Executive Committee may restrict the power to sign a particular document or type of document to specific persons among the Officers; and it shall determine rules for the signing of cheques.

11·3. The President shall be the official representative of the Union on all other civil and legal occasions and in dealing with other organizations. He may in this respect delegate his powers to another Officer of the Union, or, with approval of the Executive Committee, to any other person.

12. Dissolution of the Union

12·1. The Union shall not be dissolved except on a motion presented at a General Assembly. If a motion to dissolve is to be presented, the notice for that General Assembly as given under Statute 5·3 or 5·4 shall include a statement of the motion to dissolve and shall refer specifically to this Statute. Such a motion shall be presented to the General Assembly without amendment and at least three-fourths of the votes there represented shall be required for dissolution.

In the event that less than three-fourths of the total number of the votes of all Adhering Bodies are represented at the General Assembly, a postal ballot may be arranged, and in such a postal ballot at least three-fourths of the total number of the votes of all Adhering Bodies shall be required for dissolution.

12·2. In the event of dissolution of the Union in accordance with Statute 12·1, the General Assembly shall appoint a special Committee, reporting to the International Council of Scientific Unions, for the liquidation of the assets of the Union. The nett assets shall be given to one or more, preferably international, organizations or institutions which shall spend the assets for purposes so far as is possible in accordance with the objects of the Union.

13. Statutes

13·1. Amendments to the Statutes require action at a General Assembly. An amendment is adopted at such an Assembly only if (i) at least two-thirds of the votes represented at the General Assembly are affirmative and (ii) if these affirmative votes amount to more than half the total number of the votes of all Adhering Bodies. In the event that the vote on a proposed amendment satisfies condition (i) but not condition (ii), the Executive Committee may refer the proposed amendment to a postal ballot of the Adhering Bodies. If the proposed amendment then obtains affirmative votes amounting to more than half the total number of the votes of all Adhering Bodies, the amendment is adopted.

Proposals for amendments may be made by the Executive Committee or by any National Committee. Such proposals made by National Committees shall reach the General Secretary at least six months in advance of the General Assembly. The General Secretary shall dispatch these proposals, and those made by the Executive Committee, to the National Committees and to the Commissions at least four months before the meeting.

13·2. The present English text shall be considered the authoritative text in the interpretation of these Statutes. Where disputes arise concerning this interpretation, the matter shall be decided by the General Assembly, or, during the periods between General Assemblies, by a ruling of the President of the Union.

By-Laws

1. General Assembly

1·1. The agenda of business to be transacted at a General Assembly shall be determined by the Executive Committee and shall be dispatched by the General Secretary to the National Committees and to the Commissions at least ten weeks before the meeting.

1·2. Any National Committee and any Commission of the Union may propose business to be transacted at a General Assembly. Such proposals shall reach the General Secretary at least four months before the meeting, and shall be included in the agenda of the General Assembly.

1·3. The General Assembly may provisionally determine the date and the place of the next but one ordinary meeting of the General Assembly.

1·4. Chairmen of the National Committees and of the Commissions, and representatives of Regional Associates and Scientific Associates may attend the General Assembly and take part in the discussions but shall have no voting power. The President may invite representatives of scientific bodies, or individuals, to attend the General Assembly; such invited guests may take part in the discussions but shall have no voting power. Other interested persons may also attend the General Assembly but they shall not take part in the dis-

cussions, unless specifically invited or permitted to do so by the Chairman, and they shall have no voting power.

At the discretion of the Chairman any or all of the persons attending the General Assembly under this By-Law may be required to withdraw.

1·5. If a delegate to a General Assembly is absent from a session of the Assembly, his place may be taken by any of the alternates nominated to the Assembly under Statute 5·6 provided that the Secretary of the Assembly is notified before the beginning of the session of the name of the delegate and of the name of the alternate, either by the delegate or by the chairman of his delegation. In general no such substitution may take place during a session of the Assembly, but the Chairman of the Assembly may permit substitution to be made under special circumstances.

1·6. The names of the representatives of a Body whose application for adherence to the Union has been received and declared in good order by the Executive Committee under By-Law 2·9(*a*), shall be made known to the General Secretary as prescribed in Statute 5·6. These representatives shall be seated with the delegates of the Adhering Bodies during the preliminary ceremonies and the initial business of the General Assembly. At the discretion of the Chairman or by a vote of the Assembly, the representatives may be required to withdraw during the discussion of and voting on matters concerning adherence to the Union. The delegates of a new member may take their seats among the other delegates as soon as the General Assembly has accepted their Adhering Body as a member of the Union.

1·7. Unless decided otherwise by the General Assembly, matters concerning adherence to the Union shall take precedence over all other business at the first business session of the General Assembly, and shall normally precede the reading of the minutes and the discussions of matters arising therefrom.

1·8. Delegates of an Adhering Body may not vote on any matter concerning its membership in the Union.

1·9. In the event of the General Assembly considering a change in a group of Countries according to Statute 3·12, the delegates from the Countries belonging or previously belonging to the group may not vote on any matters concerning the representation in the Union of any of these Countries. After acceptance of the *ad interim* arrangements made by the Executive Committee under Statute 3·12, these delegates have full voting power.

1·10. The delegates of new members may not vote on any matters concerning adherence to the Union, nor on any matters concerning the adoption of the minutes of the previous General Assembly, during the General Assembly at which they themselves are admitted.

1·11. The General Secretary shall post on the official bulletin board of the General Assembly the names of the Chairmen and members (and alternates, if any) of the delegations and the numbers of votes represented by them.

1·12. During the General Assembly any delegate (or alternate) and any Officer of the Union is considered to have been notified of any action of the General Assembly, or of the Executive Committee, or of any Commission, if one of the two following procedures is adopted

(*a*) a notice is placed in the mail box or other location at which the delegate (or alternate) or the Officer is accustomed to receive his mail during the course of the General Assembly, or

(*b*) a notice is handed to the designated Chairman of each delegation with the specific request that he communicate its contents to his delegation, and to the General Secretary with the specific request that he communicate its contents to the Executive Committee,

provided that in either case a similar notice is posted on the official bulletin board.

1·13. Minutes of the meetings of the General Assembly shall be made. Copies of the draft minutes shall be communicated by the General Secretary to the National Committees, to the Officers of the Union and to the Chairmen of its Commissions. After approval at a subsequent General Assembly, two copies of the definitive minutes shall be signed by the Chairman and the Secretary of the session at which they are approved, and shall be kept by the President and the General Secretary.

2. Executive Committee

2·1. The Executive Committee shall meet at each General Assembly. There shall be at least two additional meetings during the period between General Assemblies, unless the Executive Committee by a postal vote decides otherwise.

2·2. The Executive Committee shall make nominations to the General Assembly for the Officers of the Union, for the Chairmen and members of the Commissions, and for representatives on Joint Commissions and on other scientific bodies. Normally these nominations shall be made after a preceding postal communication with the National Committees. In each case in which an Officer of the Union is nominated for another office, either by the Executive Committee or by delegates to the General Assembly [By-Law 7·2], the Executive Committee shall also include a nomination for the office which would be vacated if the election to the other office occurs. If the election to the other office does not occur and if the Officer's term has not expired, the nomination to the office which would have been vacated shall not be considered.

2·3. In the event of the resignation, death or disability of the President, the Vice-President shall assume the office of President until the close of the next ordinary General Assembly.

In the event of the resignation, death or disability of the Vice-President, the Executive Committee may appoint one of its members to serve as Vice-President until the close of the next ordinary General Assembly.

In the event of such circumstances that the General Secretary or the Treasurer cannot carry out his duties, the other shall assume those duties until the Executive Committee has considered the situation. In that event the Executive Committee may, but need not, appoint a new General Secretary or Treasurer to serve until the close of the next ordinary General Assembly.

In the event of the resignation, death or disability of an ordinary member of the Executive Committee, the Executive Committee may co-opt a new member to serve until the close of the next ordinary General Assembly.

The accession of an Officer of the Union to a new office under the conditions of this By-Law shall be accompanied by his resignation from the office to which he was previously elected, but service under this By-Law shall not affect his eligibility for immediate re-election to the new office.

2·4. Any Officer unable to attend a meeting of the Executive Committee may designate a deputy to attend that meeting. Such a deputy shall be named in writing to the President or the General Secretary. He shall have no voting power and shall not be counted as part of a quorum.

2·5. The President, on his own initiative or at the request of the Executive Committee, may invite any individual to be present at a meeting of the Executive Committee; such an invited guest may take part in the discussions but shall have no voting power.

2·6. At a meeting of the Executive Committee two-thirds (fractional parts neglected) of the Officers specified by Statutes 6·1 and 6·3, excluding any who have resigned or died, shall constitute a quorum; and decisions shall be taken by a simple majority of the Officers present and voting. The Chairman of the meeting shall not vote in open ballots; but in the event of an equal division of votes the Chairman may take the final decision. In secret ballots required by the Statutes or By-Laws or ordered by the Chairman he may vote at his discretion. If he does not vote and there is an equal division of votes he may take the final decision. If he has voted in a secret ballot he may not take the final decision, and must leave it to further discussion and ballot.

2·7. During the period between meetings of the Executive Committee, voting may take place by post. Adoption of a proposal shall require affirmative votes from two-thirds (fractional parts neglected) of the Officers specified by Statutes 6·1 and 6·3, excluding any who have resigned or died. No decision on any proposal other than calling or cancelling a meeting of the Executive Committee shall be made by postal vote in the event that at least two Officers express the wish that the matter concerned should first be given more or further consideration, either by correspondence or at a meeting of the Executive Committee.

2·8. Minutes of the meetings of the Executive Committee shall be made. Two copies of the minutes shall be signed by the Chairman and the Secretary of the meeting at which they are approved, and shall be kept by the President and the General Secretary. A summary of the draft minutes of meetings of the Executive Committee shall be despatched by the General Secretary to the National Committees within ten weeks of the conclusion of each meeting.

2·9. In addition to the obligations described in the Statutes and elsewhere in these By-Laws, the Executive Committee shall

(*a*) receive and report on applications for adherence to the Union if the nature of the applying Body and the membership of the National Committee have been duly reported to and considered to be in good order by the Executive Committee; pending the next General Assembly the Executive Committee may in the case of such applications provide such services of the Union as it deems proper;

(*b*) consider and report on any other questions concerning adherence to the Union;

(*c*) present an annual report, including an audited statement of receipts and expenditure, to the National Committees;

(*d*) report to the Commercial Registry of Geneva any changes in the registered information concerning the Union;

(*e*) have the power to appoint representatives on scientific bodies not belonging to the Union.

3. President

3·1. The President of the Union is Chairman of the General Assembly and of the Executive Committee. In the absence of the President from a session or meeting, the Vice-President, or if he is not present another Officer of the Union designated by the Executive Committee, shall act as Chairman.

3·2. The President of the Union is an *ex officio* member, with voting power, of all Commissions of the Union.

4. General Secretary

4·1. The General Secretary of the Union is Secretary of the General Assembly and of the Executive Committee. In his absence from a session or meeting, another Officer of the Union designated by the Executive Committee shall act as Secretary.

4·2. The General Secretary of the Union is an *ex officio* member, with voting power, of all Commissions of the Union.

4·3. The General Secretary is responsible for conducting the ordinary business of the Union, with the exception of the financial administration, and for keeping its records.

5. Treasurer

5·1. The Treasurer of the Union is responsible for the financial administration of the Union and for keeping its accounts.

5·2. The Treasurer is an *ex officio* member of all Commissions of the Union, with voting power only for those questions which may involve the Union in financial commitments.

6. Commissions of the Union

6·1. The Chairmen of the Commissions and the chief representatives on Joint Commissions or other bodies shall forward records of all meetings of the Commissions to the President and the General Secretary. They shall report annually on the activities of these bodies to the Executive Committee.

6·2. If funds are provided for the use of a Commission, it may make its own financial arrangements, with the prior approval of the Executive Committee and subject to the provisions of the Statutes and By-Laws. In cases where the Executive Committee has given prior approval, payments toward travelling expenses of Chairmen and members of Commissions may be made from the general funds of the Union.

6·3. No person who has served for three consecutive full terms of office on a Commission is eligible for nomination for a fourth consecutive term of service on the same Commission except as Chairman. In no case is any person eligible for more than four consecutive full terms of service on the same Commission. These limitations do not apply to Editors [Statute 7·1], Co-editors [Statute 7·2] and *ex officio* members. Any Commission, in its Rules of Procedure, may reduce the length of service specified here.

6·4. In the event of the resignation, death or disability of the Chairman of any Commission, the Executive Committee shall appoint a member of that Commission to serve as Chairman until the close of the General Assembly following this appointment.

7. Nominations and Elections

7·1. All delegates (and alternates) shall be notified of the nominations presented by the Executive Committee under By-Law 2·2 for the Officers of the Union as early as possible and at least ninety-six hours before the scheduled commencement of the session of the General Assembly at which the vote is to be taken.

7·2. After the delegates have been notified of the nominations by the Executive Committee as prescribed in By-Law 7·1, other nominations for Officers of the Union may be made by any six or more delegates. Such nominations shall be made in writing to the General Secretary not less than thirty-six hours before the voting session and shall be accompanied by a written statement that the consent of the nominees has been obtained. These nominations shall be posted by the General Secretary on the official bulletin board not less than twenty-four hours before that session.

7·3. Recommendations from each Commission for the Chairman and members of the Commission shall be made in writing to the General Secretary not less than seventy-two hours before the voting session of the General Assembly. These recommendations shall be approved by a majority of the members of the Commission and shall be accompanied by a written statement that the consent of the persons recommended has been obtained. All delegates (and alternates) shall be notified of the nominations presented by the Executive Committee under By-Law 2·2 for the Chairman and members of each Commission at least forty-eight hours before the voting session.

7·4. After the delegates have been notified of the nominations by the Executive Committee as prescribed in By-Law 7·3, other nominations for the Chairman and members of each Commission may be made by any six or more delegates. Such nominations shall be made in writing to the General Secretary not less than twenty-four hours before the voting session and shall be accompanied by a written statement that the consent of the nominees has been obtained. These nominations shall be posted by the General Secretary on the official bulletin board not less than twelve hours before that session.

7·5. In voting for the President, Vice-President, General Secretary and Treasurer of the Union, each of these offices shall be taken separately and voting shall be by secret ballot. A simple majority of the votes represented by the delegates present at the voting session shall be required for election. If there is only one candidate for one of these offices, his nomination shall be presented to the General Assembly and the candidate concerned shall be considered as elected. If there are two candidates or more, and an election is not achieved after two ballots, the candidate receiving the smallest number of votes in the second ballot shall be removed from the list. If an election is not achieved after a third ballot, this procedure shall be repeated until an election is achieved. Any ballot form showing more than one mark shall be invalid. Any contingency arising during the balloting shall be resolved by a ruling of the Chairman of the General Assembly.

7·6. The election of the ordinary members of the Executive Committee shall be by secret ballot, the ballot form showing the nominations presented by the Executive Committee and the nominations made by delegates. A simple majority of the votes represented by delegates present at the voting session shall be required for election. If there are not more candidates than vacancies, the nominations shall be presented to the General Assembly and the candidates shall be considered as elected. If there are more candidates than vacancies and all vacancies are not filled by election at the first ballot, a second ballot shall be arranged containing the names of the candidates not elected. If there are vacancies after the second ballot, the balloting procedure shall be repeated until all vacancies are filled; for each of these subsequent ballots the name of the candidate receiving the smallest number of votes on the preceding ballot shall be removed from the list. Any ballot form showing more marks than the appropriate number of vacancies shall be invalid. Any contingency arising during the balloting shall be resolved by a ruling of the Chairman of the General Assembly.

7·7. In the event that an election must be held to fill the unexpired term of an office vacated by an ordinary member [Statute 6·4], the nominations for this office shall be distinct from the nominations for ordinary members for full terms. A person may be nominated for both categories, but can be elected to only one office [Statute 6·3]. If ballots are required in the elections for both categories, the ballots for the full-term offices shall take place first. A person who has been elected to two consecutive non-full terms is not eligible, on completion of his second term, for immediate re-election as an ordinary member of the Executive Committee.

7·8. In voting for the Chairmen and members of the Commissions each Commission shall be considered separately. For the election of the Chairmen the procedure described in By-Law 7·5 shall be followed. For the election of the members of the Commissions the procedure described in By-Law 7·6 shall be followed except that no more than two ballots shall be held. Any vacancies still remaining may be filled as provided in Statute 8·2.

7·9. The procedure for the nomination and election of representatives of the Union on Joint Commissions and on other scientific bodies is so far as is possible the same as that for the nomination and election of the Chairmen and members of the Commissions.

8. By-Laws

8·1. These By-Laws may be amended or suspended at any General Assembly and at least two-thirds of the votes there represented are required for an amendment or suspension. A motion to amend or suspend, if not already included in the agenda of business of the General Assembly, may be placed there by the procedure of Statute 5·9. No notice is required for a proposal to suspend the time limits prescribed by By-Laws 7·2 and 7·4. Notification of any other motion to amend or suspend the By-Laws must be given by its originators to all delegates (and alternates) and to all Officers of the Union in accordance with the procedure prescribed in By-Law 1·12, at least forty-eight hours before the session of the General Assembly at which the motion is to be considered.

8·2. Words importing the male sex in the Statutes and By-Laws shall include the female sex.

8·3. The present English text shall be considered the authoritative text in the interpretation of these By-Laws. Where disputes arise concerning this interpretation, the matter shall be decided by the General Assembly, or during the periods between General Assemblies, by a ruling of the President of the Union.

APPENDIX

Timetable in Preparation for General Assembly

		Statute	By-Law
12 months	Notice of date and place of ordinary General Assembly to National Committees and Commissions	5·3	–
8 months	Notice of date and place of extraordinary General Assembly to National Committees and Commissions, if amendment of Statutes is contemplated	5·4	–
6 months	Proposals for amendments to Statutes to General Secretary	13·1	–
5 months	Estimated budgets from Commissions to Executive Committee	9·2	–
4 months	Proposals for agenda of General Assembly to General Secretary	–	1·2
4 months	Notice of date and place of extraordinary General Assembly to National Committees and Commissions, if amendment of Statutes is not contemplated	5·4	–
4 months	Proposals for amendments to Statutes to National Committees and Commissions	13·1	–
14 weeks	Reports of Commissions to General Secretary	8·4	–
10 weeks	Report of Executive Committee to National Committees and Commissions	6·8	–
10 weeks	Reports of Commissions to National Committees and Commissions	8·4	–
10 weeks	Budget to National Committees and Commissions	9·3	–
10 weeks	Agenda to National Committees and Commissions	–	1·1

Timetable during General Assembly

'Before'	Notice by National Committees to General Secretary of names of delegates, alternates and chairmen of delegations, and of distribution of votes if not one per delegate	5·6, 5·7	–
96 hours	Nominations by Executive Committee for Officers of Union	–	7·1
72 hours	Recommendations by Commissions to General Secretary for Chairmen and members of Commissions	–	7·3
48 hours	Nominations by Executive Committee for Chairmen and members of Commissions	–	7·3
48 hours	Notification of motion to amend or suspend By-Laws	–	8·1
36 hours	Notice to General Secretary of nominations by delegates for Officers of Union	–	7·2
24 hours	Posting of nominations by delegates for Officers of Union	–	7·2
24 hours	Notice to General Secretary of nominations by delegates for Chairmen and members of Commissions	–	7·4
12 hours	Posting of nominations by delegates for Chairmen and members of Commissions	–	7·4

ANNEX III

Committees, Commissions, Regional and Scientific Associates and Representatives on Other Bodies

Membership of Bodies belonging to the Union

EXECUTIVE COMMITTEE

President

N. Kato*
Department of Crystalline Materials Science, Faculty of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464, Japan

Vice-President

A. J. C. Wilson* (UK)

General Secretary and Treasurer

S. E. Rasmussen*
Department of Chemistry, Aarhus University, DK-8000 Aarhus C, Denmark

Immediate Past President

A. Magnéli* (Sweden)

Ordinary Members

F. R. Ahmed* (Canada)
E. F. Bertaut* (France)
J. Karle† (USA)
H. Neels† (German Democratic Republic)
S. Ramaseshan* (India)
V. I. Simonov† (USSR)

Executive Secretary

J. N. King
International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England.

COMMISSION ON JOURNALS

Chairman and Editor of Acta Crystallographica

S. C. Abrahams
Bell Laboratories, 600 Mountain Avenue, Murray Hill, New Jersey 07974, USA

Co-Chairman and Editor of Journal of Applied Crystallography

M. Hart
Department of Physics, King's College, Strand, London WC2R 2LS, England

Co-editors

F. R. Ahmed (Canada; *Acta*)
G. Allegra (Italy; *Acta*)
J. B. Cohen (USA; *JAC*)
J. M. Cowley (USA; *Acta*)
G. A. Jeffrey (USA; *Acta*)
J. C. Joubert (France; *JAC*)
G. Kostorz (Federal Republic of Germany; *JAC*) (as from 1 September 1979)
E. C. Lingafelter (USA; *Acta*)
J. Protas (France; *Acta*)
Y. Saito (Japan; *Acta*)
H. Schulz (Federal Republic of Germany; *Acta*)
G. A. Sim (UK; *Acta*)
V. I. Simonov (USSR; *Acta*) (as from 1 May 1979)
D. Watanabe (Japan; *JAC*)
P. J. Wheatley (UK; *Acta*)
M. M. Woolfson (UK; *Acta*)

Book-review Editor

J. H. Robertson (UK; *Acta* and *JAC*)

COMMISSION ON STRUCTURE REPORTS

Chairman and Editor

J. Trotter
Department of Chemistry, University of British Columbia, 2075 Wesbrook Mall, Vancouver, Canada V6T 1W5

Co-editors

L. D. Calvert (Canada)
G. Ferguson (Canada)
J. Iball (UK)
C. B. Shoemaker (USA)
N.-G. Vannerberg (Sweden)

Ex officio member

D. G. Watson (UK) (as Chairman of the Commission on Crystallographic Data)

COMMISSION ON INTERNATIONAL TABLES

Chairman and Editor

Th. Hahn
Insitut für Kristallographie der Technische Hochschule, Templergraben 55, 51 Aachen, Federal Republic of Germany

Co-editors

H. G. A. Arnold (Federal Republic of Germany)
E. F. Bertaut (France)
Y. Billiet (France)
M. J. Buerger (USA)
H. Burzlaff (Federal Republic of Germany)
W. Fischer (Federal Republic of Germany)
V. A. Koptsik (USSR)
A. Vos (Netherlands) (Secretary)
H. Wondratschek (Federal Republic of Germany)

COMMISSION ON CHARGE, SPIN AND MOMENTUM DENSITIES

Chairman

K. V. J. Kurki-Suonio
Department of Physics, University of Helsinki, Siltavuorenpenger 20 c, SF-00170 Helsinki 17, Finland

Elected members

P. Becker (France)
R. A. Bonham (USA)
P. J. Brown (France)
M. J. Cooper (UK) (Secretary)
P. Coppens (USA)
E. N. Maslen (Australia)
R. M. Moon (USA)
R. P. Ozerov (USSR)
Y. Saito (Japan)
J. R. Schneider (Federal Republic of Germany)
V. H. Smith (Canada)

Ex officio member

D. Cox (USA) (as Chairman of the Commission on Neutron Diffraction)

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* Until the close of the Twelfth General Assembly (1981).

† Until the close of the Thirteenth General Assembly (1984).

COMMISSION ON CRYSTAL GROWTH

Chairman

E. Kaldis
Laboratorium für Festkörperphysik, Eidgenössische Technische Hochschule, CH-8049 Zürich, Hönggerberg, Switzerland

Elected members

A. Authier (France)
K. S. Bagdasarov (USSR)
P. Krishna (India) (Secretary)
A. R. Lang (UK)
K. Nassau (USA)
H. Peibst (German Democratic Republic)
I. Sunagawa (Japan)

Ex officio members

D. T. J. Hurle (UK) (representative of the International Organization for Crystal Growth)
M. Hart (UK) (as Editor of *Journal of Applied Crystallography*)

COMMISSION ON CRYSTALLOGRAPHIC APPARATUS

Chairman

S. Abrahamsson
Department of Structural Chemistry, Faculty of Medicine, University of Göteborg, Medicinaregatan 9, POB, S-400 33 Göteborg 33, Sweden

Elected members

J. Čermák (Czechoslovakia)
R. W. Hendricks (USA)
H. Hope (USA)
S. Hosoya (Japan)
V. G. Lutsau (USSR)
S. Martinez Carrera (Spain)
P. Suortti (Finland)

COMMISSION ON CRYSTALLOGRAPHIC COMPUTING

Chairman

R. Diamond
Laboratory of Molecular Biology, Medical Research Council, Hills Road, Cambridge CB2 2QH, England

Elected members

V. I. Andrianov (USSR)
T. Ashida (Japan)
S. R. Hall (Australia)
K. Huml (Czechoslovakia)
A. C. Larson (USA)
H. Schenk (Netherlands)
K. Venkatesan (India)

Ex officio member

D. G. Watson (UK) (as Chairman of the Commission on Crystallographic Data)

COMMISSION ON CRYSTALLOGRAPHIC DATA

Chairman

D. G. Watson
University Chemical Laboratory, Lensfield Road, Cambridge CB2 1EW, England

Elected members

G. Bergerhoff (Federal Republic of Germany)
I. D. Brown (Canada)
A. D. Mighell (USA)
M. Nardelli (Italy)
E. Parthé (Switzerland)
C. Römming (Norway)
N. L. Smirnova (USSR)
A. J. C. Wilson (UK)

Ex officio members

R. Diamond (UK) (as Chairman of the Commission on Crystallographic Computing)
J. Trotter (Canada) (as Chairman of the Commission on *Structure Reports*)
S. C. Abrahams (USA) (as Chairman of the Commission on Journals)

COMMISSION ON CRYSTALLOGRAPHIC NOMENCLATURE

Chairman

S. C. Abrahams
Bell Laboratories, 600 Mountain Avenue, Murray Hill, New Jersey 07974, USA

Members

Th. Hahn (Federal Republic of Germany)
J. Trotter (Canada)
M. Hart (UK)

COMMISSION ON CRYSTALLOGRAPHIC STUDIES AT CONTROLLED PRESSURES AND TEMPERATURES

Chairman

S. Akimoto
Institute for Solid State Physics, University of Tokyo, 22-1 Roppongi 7-chome, Minato-ku, Tokyo 106, Japan

Elected members

B. Buras (Denmark)
S. S. Kabalkina (USSR)
F. Lissalde (France)
G. J. Piermarini (USA)
C. T. Prewitt (USA)
K. F. Seifert (Federal Republic of Germany)
A. K. Singh (India)
J. P. Traverse (France)

Ex officio members

S. Abrahamsson (Sweden) (as Chairman of the Commission on Crystallographic Apparatus)
K. Kuchitsu (Japan) (as Chairman of the Commission on Electron Diffraction)
D. E. Cox (USA) (as Chairman of the Commission on Neutron Diffraction)

COMMISSION ON CRYSTALLOGRAPHIC TEACHING

Chairman

A. Authier
Laboratoire de Minéralogie-Cristallographie, Université de Paris VI, Tour 16, 4 place Jussieu, 75230 Paris CEDEX 05, France

Elected members

S. Caticha-Ellis (Brazil)
E. Hoehne (German Democratic Republic)
C. H. L. Kennard (Australia)
P. Krishna (India)
M. Laing (South Africa)
W. M. Meier (Switzerland) (Secretary)
G. Rigault (Italy)
H. Schenk (Netherlands)
M. P. Shaskol'skaya (USSR)

COMMISSION ON ELECTRON DIFFRACTION

Chairman

K. Kuchitsu
Department of Chemistry, Faculty of Science, University of Tokyo, Hongo, 7-chome, Bunkyo-ku, Tokyo 113, Japan

Elected members

S. Amelinckx (Belgium)
P. Goodman (Australia)
A. Haaland (Norway)
K. W. Hedberg (USA)
J. B. Pendry (UK)
S. A. Semiletov (USSR)
G. A. Somorjai (USA)
D. Watanabe (Japan)
M. J. Whelan (UK)

COMMISSION ON NEUTRON DIFFRACTION

Chairman

D. E. Cox
Department of Physics,
Brookhaven National
Laboratory, Upton, NY 11973,
USA

Elected members

P. J. Brown (France)
R. Chidambaram (India)
H. Dachs (Federal Republic of Germany)
S. Hoshino (Japan)
B. Jacrot (France)
B. van Laar (Netherlands)
M. S. Lehmann (France)
T. M. Sabine (Australia)
W. B. Yelon (USA)

Regional and Scientific Associates

Regional Associate: EUROPEAN CRYSTALLOGRAPHIC COMMITTEE

Scientific Associate: INTERNATIONAL ORGANIZATION FOR CRYSTAL GROWTH

Representatives on Bodies not belonging to the Union

COMMISSION ON THE SOLID STATE OF THE INTERNATIONAL UNION OF PURE AND APPLIED PHYSICS

Representative

A. Línek
Fysikální ústav,
Československá Akademie Věd,
Libeň,
Na Slovance 2,
180 40 Praha 8,
Czechoslovakia

CONFERENCE COMMITTEE OF THE EUROPEAN PHYSICAL SOCIETY

Representative

A. Línek
Fysikální ústav,
Československá Akademie Věd,
Libeň,
Na Slovance 2,
180 40 Praha 8,
Czechoslovakia

EUROPEAN CRYSTALLOGRAPHIC COMMITTEE

Representative

J. Karle*
Code 6030,
Naval Research Laboratory,
Washington DC 20375, USA

* Appointed by the Executive Committee after the Eleventh General Assembly.

INTERNATIONAL ORGANIZATION FOR CRYSTAL GROWTH

Representative

E. Kaldis
Laboratorium für
Festkörperphysik,
Eidgenössische Technische
Hochschule, CH-8049 Zürich,
Hönggerberg,
Switzerland

Alternate

A. Authier
Laboratoire de Minéralogie-Cristallographie,
Université de Paris VI,
Tour 16, 4 place Jussieu,
75230 Paris CEDEX 05,
France

ICSU ABSTRACTING BOARD

Representative

A. J. C. Wilson
Department of Physics,
University of Birmingham,
PO Box 363,
Birmingham B15 2TT,
England

ICSU COMMITTEE ON DATA FOR SCIENCE AND TECHNOLOGY (CODATA)

Representative

D. G. Watson (UK) (*ex officio* as Chairman of the Commission on Crystallographic Data)

ICSU COMMITTEE ON SCIENCE AND TECHNOLOGY IN DEVELOPING COUNTRIES (COSTED)

Representative

A. Authier
Laboratoire de Minéralogie-Cristallographie,
Université de Paris VI,
Tour 16, 4 place Jussieu,
75230 Paris CEDEX 05,
France

ICSU COMMITTEE ON SPACE RESEARCH (COSPAR)

Representative

E. Kaldis
Laboratorium für
Festkörperphysik,
Eidgenössische Technische
Hochschule, CH-8049 Zürich,
Hönggerberg,
Switzerland

ICSU COMMITTEE ON THE TEACHING OF SCIENCE

Representative

A. Authier (France) (*ex officio* as Chairman of the Commission on Crystallographic Teaching)

ICSU SCIENTIFIC COMMITTEE ON PROBLEMS OF THE ENVIRONMENT (SCOPE)

Representative

P. Kierkegaard
Department of Structural Chemistry, Arrhenius Laboratory, University of Stockholm, Fack,
S-10405 Stockholm, Sweden

ANNEX IV
Adhering Bodies

Country	*Category**	*Adhering Body*	*Secretary of National Committee*
Argentina	I	Consejo Nacional de Investigaciones Cientificas y Técnicas	M. A. R. DE BENYACAR, Division Fisica del Solido, Comision Nacional de Energia Atomica, Av. del Libertador 8250, 1429 Buenos Aires
Australia	III	Australian Academy of Science	The Executive Secretary, Australian Academy of Science, PO Box 783, Canberra City, ACT 2601
Austria	I	Österreichische Akademie der Wissenschaften	A. PREISINGER, Institut für Mineralogie, Kristallographie und Strukturchemie der Technischen Universität Wien, Getreidemarkt 9, A-1060 Vienna
Belgium	II	Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique	P. PIRET, Laboratoire de Chimie Physique et de Cristallographie, Université de Louvain, 1 place Louis Pasteur, 1348 Louvain-la-Neuve
Brazil	III	Conselho Nacional de Desenvolvimento Cientifico e Tecnologico†	S. CATICHA ELLIS, DESCM, Instituto de Física, Universidade Estadual de Campinas, Campinas, São Paulo 13100
Canada	III	National Research Council	C. P. HUBER, Division of Biological Sciences, National Research Council of Canada, Ottawa, Ontario K1A 0R6
Chile	I	National Committee for Crystallography	I. GARACOCHEA-WITTKE, Departamento de Física, Universidad de Chile, Casilla 5487, Santiago
China, People's Republic of	IV	Academia Sinica	KU HSIAO-CHENG, Department of Biology, Peking University, Peking
Czechoslovakia	I	Československá Akademie Věd	A. LÍNEK, Fysikální ústav, Československá Akademie Věd, Libeň, Na Slovance 2, 180 40 Praha 8
Denmark	I	Royal Danish Academy of Sciences and Letters	I. KJØLLER LARSEN, The Royal Danish School of Pharmacy, Chemical Laboratory C, Universitetsparken 2, 2100 Copenhagen Ø
Egypt, Arab Republic of	I	Academy of Scientific Research and Technology	I. S. AHMED FARAG, Unit of Crystallography, National Research Centre, Dokki, Cairo
Finland	I	Suomalainen Tiedeakatemia	L. TAHVONEN, Department of Physics, University of Helsinki, Siltavuorenpenger 20c, SF-00170 Helsinki 17
France	IV	Académie des Sciences (Institut de France)	J. F. PETROFF, Association Française de Cristallographie, Tour 26, 4 place Jussieu, 75230 Paris CEDEX 05
German Democratic Republic	II	Vereinigung für Kristallographie in der GGW der DDR	H. PEIBST, Zentralinstitut für Elektronenphysik, Akademie der Wissenschaften der DDR, Mohrenstrasse 40/41, DDR-108 Berlin
Germany, Federal Republic of	IV	Arbeitsgemeinschaft Kristallographie	H. SCHULZ, Max-Planck-Institut für Festkörperforschung, Büsnauer Strasse 171, 7000 Stuttgart 80
Hungary	I	Magyar Tudományos Akadémia	L. ZSOLDOS, Research Institute for Technical Physics, Hungarian Academy of Sciences, PO Box 76, H-1325 Budapest
India	I	Indian National Science Academy	P. KRISHNA, Department of Physics, Banaras Hindu University, Varanasi 221005
Israel	I	Israel Academy of Sciences and Humanities	Z. SHAKKED, Department of Structural Chemistry, The Weizmann Institute of Science, Rehovot
Italy	III	Consiglio Nazionale delle Ricerche	G. FILIPPINI, Istituto di Chimica Fisica, Università di Milano, Via Golgi 19, Milano
Japan	IV	Science Council of Japan	Y. TAKÉUCHI, Mineralogical Institute, Faculty of Science, The University of Tokyo, 3–1 Hongo 7-chome, Bunkyo-ku, Tokyo 113
Netherlands	III	Stichting voor Fundamenteel Onderzoek der Materie met Röntgen- en Elektronenstralen	The Executive Secretary, FOMRE, Laan van Meerdervoort 53d, 2517 AE 's-Gravenhage

* Adherence to the Union is in one of five Categories I–V, with corresponding voting powers and contributions as set out in Statutes 3·6, 5·5 and 9·4.

† The replacement of the previous Adhering Body in Brazil by the Conselho Nacional de Desenvolvimento Cientifico e Tecnologico was approved by the Executive Committee in April 1979.

Country	*Category**	*Adhering Body*	*Secretary of National Committee*
New Zealand	I	The Royal Society of New Zealand	J. M. WATERS, Chemistry Department, University of Auckland, Private Bag, Auckland
Norway	I	Det Norske Videnskaps-Akademi	CHR. RØMMING, Department of Chemistry, University of Oslo, PO Box 1033, Blindern, Oslo 3
Poland	I	Polska Akademia Nauk	A. PIETRASZKO, Instytut Niskich Temperatur i Badań Strukturalnych, Polskiej Akademii Nauk, Plac Katedralny, 1, 50–950 Wrocław
South Africa	I	South African Council for Scientific and Industrial Research	P. LE R. MALHERBE, International Relations Division, CSIR, PO Box 395, Pretoria 0001
Spain	III	Consejo Superior de Investigaciones Científicas	S. MARTÍNEZ CARRERA, Instituto de Química Física 'Rocasolano', Consejo Superior de Investigaciones Científicas, Serrano 119, Madrid 6
Sweden	II	Kungliga Vetenskapsakademien	S. ABRAHAMSSON, Department of Structural Chemistry, University of Göteborg, Medicinaregatan 9, S400 33 Göteborg 33
Switzerland	II	Schweizerische Gesellschaft für Kristallographie	W. M. MEIER, Institut für Kristallographie und Petrographie, Sonneggstrasse 5, ETH-Zentrum, CH-8092 Zürich
UK	V	The Royal Society	The Executive Secretary, The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG
USA	V	National Academy of Sciences – National Research Council	J. P. GLUSKER, The Institute for Cancer Research, 7701 Burholme Avenue, Fox Chase, Philadelphia, PA 19111
USSR	V	Akademija Nauk SSSR	V. I. SIMONOV, Institute of Crystallography, Leninsky prospekt 59, Moscow 117333
Yugoslavia	I	Jugoslavenska Akademija Znanosti i Umjetnosti	B. KAMENAR, Laboratory of General and Inorganic Chemistry, Faculty of Science, Ulica Soc. Revolucije 8, 41 000 Zagreb

* See footnote on preceding page.

National Committees for Crystallography

Argentina

S. BAGGIO (Chairman), M. E. J. DE ABELEDO, L. N. BECKA, D. BEDLIVY, M. A. R. DE BENYACAR, A. BONFIGLIOLI, M. BUTSCHOWSKI, E. E. GALLONI, M. IPOHORSKI, A. PODJARNY.

Australia

A. F. MOODIE (Chairman), I. GREY, C. H. L. KENNARD, A. MCL. MATHIESON, T. M. SABINE, R. L. SEGALL, M. R. SNOW, N. C. STEPHENSON.

Austria

A. PREISINGER (Chairman), H. HERITSCH, O. KRATKY, H. NOWOTNY, E. H. K. SCHMID, J. ZEMANN.

Belgium

M. VAN MEERSSCHE (Chairman), S. AMELINCKX, H. BRASSEUR, L. DANGUY, W. DEKEYSER, F. DURANT, R. GEVERS, O. GOCHE, L. HABRAKEN, G. JACOBS, G. S. D. KING, E. LEGRAND, J. MOREAU, P. PIRET, J. TOUSSAINT.

Brazil

R. RODRIQUES DA SILVA (Chairman), S. CATICHA ELLIS, Y. P. MASCARENHAS, E. TÁVORA FILHO, J. V. VALARELLI.

Canada

F. EINSTEIN (Chairman), F. R. AHMED, F. BRISSE, W. BUYERS, C. P. HUBER, K. A. KERR, E. STANLEY.

Chile

O. WITTKE (Chairman), I. GARAYCOCHEA-WITTKE.

China, People's Republic of

YOU-CHI TANG (Chairman), HUANG CHIN-LING, CHANG YUAN-LUNG, LIANG CHING-KUEI, CHIA-SI LU, HSUEH-SHAN LU, PENG CHIH-CHUNG, LIANG TUNG-TSAI, FU HUN, KU HSIAO-CHENG.

Czechoslovakia

J. GARAJ (Chairman), M. ČERNOHORSKÝ (Vice-Chairman), Č. BÁRTA, J. ČERMÁK, M. DUNAJ-JURČO, S. ĎUROVIČ, M. HANDLOVIČ, K. HUML, J. KOMRSKA, A. LÍNEK, J. MAD'AR, L. ULICKÝ.

Denmark

K. DRENCK (Chairman), E. K. ANDERSEN, J. DANIELSEN, O. DIETRICH, I. KJØLLER LARSEN, A. R. LINDEGAARD-ANDERSEN, B. J. LUND, H. MICHEELSEN, H. PAULY, J. VILLADSEN.

Egypt, Arab Republic of

M. S. AHMED (Chairman), S. A. ABDEL HADY, A. M. ABDEL REHIM, N. A. AHMED, I. S. AHMED FARAG, S. G. SHENODA, F. H. YOUSEF.

Finland

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