an earlier generation but also of more recent years, is that public interest is keen if lecture courses on such topics are given by lecturers who have the necessary gift of lucid exposition and an ability to relate their subject-matter to the familiar experiences of everyday life. If more physical/scientific workers of the present generation would devote time to discovering, by trial and error, techniques suited to the popular exposition of their subjects through the spoken word, these sciences might within a few years come to be as much in demand as the biological sciences.

But experience in adult education suggests that it is not necessary, nor even desirable, for lecturers in science to confine themselves too narrowly within their own research subjects, any more than occurs with school teachers or schools' examiners. Scientific workers when participating in adult education are not authorities addressing their professional equals, but expositors serving the needs of laymen. Their position closely resembles that of the political commentator attempting to assist public understanding of current affairs. Indeed, they may even prove to be more effective as tutors if they can share some of the difficulties experienced by their students when surveying the territory of science. To-day, scientific workers are presented with great opportunities in the field of adult education. Are they willing and ready to take advantage of them?

THE INTERNATIONAL UNION OF PHYSICS

ACTIVITIES OF THE UNION, 1923-39

AT the close of the First World War, the main pre-war international scientific organisations, some of which had been dominated by Germany, had collapsed. It was therefore decided to create a series of scientific unions to promote international co-operation. The Union of Pure and Applied Physics was formed at the end of 1923. In 1934 the Union held its most important assembly of the inter-war period. At this assembly, which was held in London, it received a report from the Commission on Standards, Units and Nomenclature which it had previously established. It approved recommendations concerning (a) thermal units, (b) units and nomenclature of electromagnetism (including the adoption of the 'oersted'), and (c) the nomenclature of thermodynamics. It decided that the Commission should continue its work, and should (i) co-operate with other international bodies in relation to definitions of terms, (ii) prepare lists and definitions of terms occurring in two or more branches of physics, and (iii) assist those who, in any country, are preparing such lists. The Commission was not intended to conduct technical investigations, such as those guided by the International Commission on Illumination. It was to receive and to review data prepared by technical commissions and to decide whether to recommend their general adoption by physicists. Associated with the 1934 Assembly was a public conference, including sections on (a) nuclear physics, and (b) the solid state. This very successful conference was held jointly with the Physical Society of London, which was mainly responsible for the organisation.

The work of the International Union of Physics may fairly be compared with that of some of the other unions which are also members of the International Council of Scientific Unions. The International Astronomical Union united thirty-four standing committees and organised many important research projects. The Union of Geodesy and Geophysics was also very active. On the other hand, the projected Union of Biological Sciences never achieved biological existence! The International Union of Pure and Applied Physics was useful—but in a limited way. One reason for its rather slight activity was that its constituent members, the national committees, were not very active in any country, and were non-existent in many.

The Assembly in Paris, January 1947

Against this background we may now consider the recent assembly held at the Sorbonne with Prof. M. Siegbahn (Sweden) as president. The secretary was Prof. P. P. Ewald (Belfast). He had undertaken the office, at the request of the president, after the death of Prof. Abraham, who had been secretary since 1923. The local arrangements were made by Prof. Fleury (director of the Institut d'Optique). The conference recognized that it owed more than a formal vote of thanks to Prof. Ewald and Prof. Fleury, whose hard work in very difficult circumstances enabled it to function smoothly. The following countries were represented: Australia, Belgium, China, Czechoslovakia, Denmark, France, Finland, Great Britain, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland.

From this list it may be seen that Western Europe is well represented, and there were also some scientific workers from Eastern Europe, although the U.S.S.R. did not accept the invitation to attend. It is hoped that the causes which prevented the representation of the United States, Canada and India are purely temporary, and that they will send delegates to the next assembly. It was suggested that ex-enemy States may also be invited as soon as peace treaties have been signed.

Apart from the necessary business of electing new officers, etc., which will be dealt with later, the chief discussion centred on the future policy of the Union. There were two chief schools of thought. The first view (sponsored by the Dutch delegation) was that the assembly should give a strong lead by appointing a large number of commissions to organise international co-operation in various branches of physics. It was urged that if this were not done, various organisations independent of the International Union of Physics would come into existence. Already a Union of Applied Mechanics and a Union of Crystallography have been formed. The Réunion des Opticiens held in Paris in October appointed a continuation committee to organise international co-operation in optics. This committee is at present willing to work as part of the International Union of Physics if possible. The Dutch delegates urged the formation of Commissions for Optics, Nuclear Physics, Low Temperatures, Magnetism, Metals, Spectrum Analysis, Cosmic Rays, Crystallography and Mechanics. On the other hand, some delegates felt that an attempt to 'organise physics from above' would certainly fail. Co-operation must be a matter of organic growth. It was believed that all the International Union can do is to recognize an urge for co-operation among a group of workers when it occurs spontaneously (as had happened with optics) and give the support of the Union.

Clearly, either of these arguments pushed to extremes must lead to absurdity. Too ambitious a programme at present would lead to a cumbersome international 'organisation' with nothing to organise. On the other hand, if the Union always waited for sections to make their plans complete, those in favour of co-operation would form separate unions, and the Union of Physics would lose its *raison d'être*. The British delegates suggested that physical sciences can, for purposes of international co-operation, be divided into two groups. The first group includes subjects such as cosmic rays and physics of the atmosphere, in which observations made at different parts of the earth's surface are complementary. An international organisation of those branches of physics may expect to undertake important projects of research which no one country could organise. The second group includes subjects such as optics and acoustics, which are concerned with the measurement of quantities which do not vary with latitude and longitude. International projects of research are likely to be less important in these subjects—though they are not impossible. Both groups of sciences may expect to benefit from international discussion of units and nomenclature and from personal contacts. On this view the International Union should establish commissions where important research projects are possible, and also where there is evidence that workers in a certain branch of physics would welcome the formation of a commission. It was decided to establish the following commissions:

(1) *Cosmic Rays*: to study the possibility of international co-operation in observations. *Chairman*: J. Clay; *Secretary*: P. Auger; *Members*: P. M. S. Blackett, W. Heitler, B. Gross, B. Rossi.

(2) *Units of Radioactivity*: to consider the proposals of Condon and Curtiss (see *Rev. Sci. Instr.*, June 1946). *Chairman*: E. U. Condon; *Members*: L. F. Curtiss, Sir Charles Darwin, E. Evans, J. C. Jacobsen, Mme. Joliot, M. Siegbahn, C. G. J. Sizoo.

(3) *Symbols, Units and Nomenclature*: to continue the work of the former commission. *Members*: P. Fleury, Ezer Griffiths, A. Pérard, Van Dijk.

(4) *Thermodynamics*: to study the definitions and nomenclature of thermodynamics and thermochemistry and to co-operate with the Commission on Standards, Units and Nomenclature, and with the International Union of Chemistry. *Members*: E. Bauer, De Boer and E. A. Guggenheim.

(5) *Optics*: to form a preparatory commission to consult the Optical Groups of various countries on the best way to bring the organisation proposed at the Réunion des Opticiens (held in October) within the framework of the International Union of Physics. The members of the preparatory commission are to co-opt persons chosen by the Optical Groups in each country so as to form a fully representative commission, the full commission to meet at an early date (probably in June at Prague). *Secretary*: P. Fleury; *Members*: R. W. Ditchburn, J. Hrdlička, E. Perucca and A. C. S. Van Heel.

The conference also appointed representatives on joint commissions dealing with (a) physico-chemical data, (b) viscosity, (c) the ionosphere, (d) radio-meteorology.

The Assembly elected Prof. Kramers as president, Prof. Fleury as secretary and Prof. Pérard as treasurer. A number of vice-presidents, including Sir Charles Darwin, were also elected. The officers form an executive committee to act until the next assembly. The executive has power to form further

commissions if there is evidence that this is desired. Any suggestion for the formation of a new commission or for any other project of international co-operation may be made to the executive through a national committee for physics.

Relations with the United Nations Educational, Scientific and Cultural Organisation

The Assembly received a report of an agreement between the United Nations Educational, Scientific and Cultural Organisation and the International Council of Scientific Unions. Under this agreement the Organisation recognizes the International Scientific Unions as "providing a natural form for the international organisation of science". It agrees to help them financially in regard to (a) international research projects, (b) travel expenditure, and (c) provision of office space, secretarial service in arrangement of meetings, etc., but *not* the general secretarial expenses of the Unions. It is expected that in conjunction with the Organisation the International Union of Physics may undertake the compilation of panels of experts in every branch of physics and, later, the publication of an international directory of physics. This directory is to include lists of laboratories with the names of workers and types of research. Other projects discussed include the publication of 'handbooks' of a type too expensive for one nation and the establishment of archives (that is, records, such as manuscripts, films, etc., of experiments and of persons of historical importance).

It was recognized that the details of co-operation with the United Nations Educational, Scientific and Cultural Organisation must be worked out gradually over a period of years; but it was felt that the agreement with the Organisation alters the whole outlook of the International Unions. They should now have sufficient funds for all useful work which lies within their terms of reference, and the backing of a permanent secretariat and a permanent organisation.

The Assembly decided to meet again in September 1948 in Holland. The interval is shorter than the usual interval of three years between meetings of the assembly, but a fairly early meeting is desirable to review the working of the new commissions and to make any alterations in statutes which may be needed to secure the full benefit of co-operation with the United Nations Educational, Scientific and Cultural Organisation.

Conclusion

May I conclude this article on a note of optimism—*restrained* optimism, but still optimism—concerning the future of the Union. The Paris Assembly was a friendly conference and its programme, although not excessively ambitious, is practical. Each of the commissions exists to meet a demand—and has therefore a definite and natural field of reference. It may be that more commissions ought to have been set up, but if the demand for this or any other useful action arises before 1948, the executive can act. Finally, the agreement with the United Nations Educational, Scientific and Cultural Organisation offers the prospect of achieving stable and permanent co-operation in science. The extent of this co-operation may be expected to grow. The rate of growth will depend on the support received from national and local scientific societies and from individual scientific workers.

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