

Preface

This volume contains the editors' survey of the proceedings of a Conference on Physics in General Education held in Rio de Janeiro in July, 1963. This was the second conference on education to be organized under the auspices of the International Union of Pure and Applied Physics (IUPAP), in association with a number of other national and international organizations. The first conference was held in UNESCO HOUSE in Paris in the summer of 1960.* The need for the first conference had become apparent from informal discussions among physicists of several countries, and the conference was organized by an ad hoc international committee; a great deal of interest was aroused throughout the world, and attendance was restricted to a limited number of officially appointed delegates from the major organizations of physics in each country. No fewer than twenty-eight countries and four international organizations were officially represented, and among them were all those countries in which physics is highly developed as a part of education and as an essential foundation of technology.

At the end of the Conference a number of resolutions were unanimously adopted. One of these was that the International Union of Pure and Applied Physics should be asked to set up a permanent committee which would be responsible for keeping under review and for actively stimulating the development of physics education internationally. Later in 1960 this recommendation was adopted by the International Union at its general assembly in Ottawa, and an International Commission on Physics Education was appointed with the following membership:

Professor Sanborn C. Brown (U.S.A.), President
Mr. Norman Clarke (U.K.), Secretary
Professor Pierre Fleury (France)
Professor V. S. Fursov (succeeded by Professor A. S. Akhmatov)
(U.S.S.R.)
Professor A. M. J. F. Michels (The Netherlands)
Professor D. Sette (Italy)
Professor Jayme Tiomno (Brazil)

*International Education in Physics, Sanborn C. Brown and Norman Clarke, Eds., The Technology Press and John Wiley & Sons, Inc., New York, 1960.

and with two corresponding members, Dr. M. A. El-Sherbini (Egypt) and Professor M. Valouch (Czechoslovakia). Since then the Commission has initiated a number of relevant activities including a regular, formal arrangement whereby it advises UNESCO on matters concerning physics education.

A second recommendation of the Paris Conference, also accepted by the general assembly of the International Union, was that further conferences should be held on specific fields of physics education. The Paris Conference, perhaps inevitably, had covered a very wide field, although it was by no means concerned with generalities, and a great deal of detailed, specific information had been submitted in previously prepared papers discussed at the conference. Nevertheless, it was felt that there was a great need to discuss in detail some of the points that had emerged in Paris, and also to relate some of the topics to the particular problems of different areas of the world. The International Commission, therefore, decided that the second conference, which is here summarized, should be concerned with problems that arise in the teaching of physics as part of the general education of all children. The first of the resolutions passed in Paris has, indeed, begun in the following words:

"In our view, physics is an essential part of the intellectual life of man at the present day," and had gone on to say "Studying physics and the physicist's methods of acquiring and evaluating knowledge should therefore be regarded as a necessary part of the education of all children."

In those countries where science is most highly developed, this has been accepted for many years as a desirable aim, and attempts have been made with varying degrees of success to implement it. In such countries difficulties of technique have been met and, perhaps above all, the difficulty of deciding the appropriate content of a course of study of physics intended to be part of the liberal education of children who are not going to be science specialists.

There are, however, many countries of the world with educational systems that do not regard science as more than a useful activity for those who are perhaps not of the highest intellectual ability, or for those who at an early age have decided that they will take up occupations for which a knowledge of science is essential. In the main, these are countries which are not highly developed either scientifically or economically, and the Commission recognized that a conference on this subject, if directed to the needs of such countries, would have to devote a substantial part of its time to the presentation of the basic arguments for the inclusion of science and of physics, in particular, in the education of all children.

For a number of reasons and after consultation with UNESCO, the Commission decided that the Conference should be held in Latin America and was glad to accept an invitation to hold it in Rio de Janeiro; this proved to be a good choice both because of relatively easy accessibility from other Latin American countries and because of the attractiveness of the city itself. The active support of the Organization of the American States, the Brazilian Ministry of Education and Culture, the

Brazilian National Research Council, the Latin American Center for Physics, and the Brazilian Center for Physics Research was readily proffered. This support was far more than formal, and the international character of the Latin American Center for Physics Research proved to be of invaluable assistance. A Committee under the chairmanship of Professor Jayme Tiomno was set up to deal with the local organization and made excellent arrangements.

It was obvious that a conference in South America would face some special organizational difficulties and would have to be arranged quite differently from that held in Paris. The Paris Conference had been organized from London, with very close, extensive, and experienced help from the French Physical Society and the Secretariat of UNESCO. In Europe and in the United States, organizers of large conferences have within easy call almost unlimited material and scientific resources and a virtually unlimited amount of experienced assistance and advice. If, for example, they wish to arrange an exhibition, there is no shortage of research laboratories and manufacturers who can provide almost anything that is required. Moreover, since Europe, the United States, and Russia are the main centers of scientific activity, it is evident that meetings held there will attract substantial numbers of scientists of distinction as participants. The less developed countries of the world are obviously unable to offer such clear advantages, but the International Commission believes that much of its work should be arranged and located so as to be of special interest to the countries that, scientifically, are less developed. Partly to meet the problem of ease of attendance, the Commission was very glad to cooperate with the Organization of American States, which was itself planning a conference on physics to be held in Latin America. By a very happy arrangement, the OAS conference was held in Rio de Janeiro in the week immediately preceding the Conference on Physics Education, and it was thus possible for a large number of physicists from South America to participate in both conferences at the cost of only one journey.

For the reasons which have been indicated, the main differences between the Paris and Rio de Janeiro Conferences were that in the second one it was not possible to have as adequate a participation from countries outside Latin America; it was not possible to have the same range of prepared papers; import formalities and restrictions made it impossible to have a truly international exhibition of equipment, and no exhibition of books could be arranged.

It was decided to present the proceedings in the same broad way as those of the Paris Conference, namely, as a volume that represented the impressions of the editors and was not merely a formal record of papers presented and the discussion upon them. At the end of the conference, the editors had the unusual experience of being, with their clerical assistants, the only occupants of a 50-bedroom hotel which from a height of 2000 feet overlooks Rio de Janeiro; such solitude for a task of this kind might well be difficult to achieve in more developed parts of the world!

The reader may consider it surprising that the record of the Paris Conference, on a much more diffuse theme, contains a great deal of detailed information of practical value to the teacher of physics,

whereas the record of this conference emphasizes, in the main, general problems of educational policy. The reason is that the discussion at this conference was along lines dictated by the problems and attitudes of South America, where it is still necessary to argue in policy terms for the inclusion of physics in general education.

The editors have condensed and in some cases rewritten very considerably the material presented, and on only one or two matters has it been thought necessary to record any summary of discussion. In the addresses and papers there is a certain amount of repetition of material presented from slightly different viewpoints, and the editors were advised that it would be useful for the purposes of Latin America that these different points of view should remain in the published record.

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"Paineiras"

Rio de Janeiro

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Sanborn C. Brown

Norman Clarke

Jayme Tiomno