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P U G W A S H N E W S L E T T E R

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C O N T E N T S

THE 14th PUGWASH CONFERENCE

The 14th Pugwash Conference on Science and World Affairs took place in Venice from the 11th to 16th April, 1965. Like the 13th Conference, it was preceded by a preparatory meeting held in Trieste on the 9th and 10th April. In addition, a meeting of the Study Group on Biological Warfare (Pugwash Newsletter Vol. 2 p. 52) was held in Trieste on the 8th, 9th and 10th April. With the Continuing Committee meeting on the 7th and 8th April, there were altogether 35 persons concerned, during the stay in Trieste, with the preparation for the Venice Conference. These meetings were held under the sponsorship of the International Centre for Theoretical Physics of which Professor Abdus Salam is the Director. The Deputy Director, Professor P. Budini, was responsible for the organization, which was most efficient, and for arranging the excellent hospitality provided by civic and industrial organizations in Trieste.

The Main Conference was held on the Isola San Giorgio Maggiore, a small island opposite the Ducal Palace. The island belongs to the Fondazione Giorgio Cini, who were one of the sponsors of the Conference. The setting was ideal; it combined seclusion with spaciousness. The beautiful cloisters, magnificent historic buildings and the modern park were conducive to contemplation, as well as providing opportunities for informal talks, which are probably the most valuable feature of a Pugwash Conference. In this respect the only drawback in Venice was that the participants had to be accommodated at three hotels, one being separated from the others by a stretch of water. This somewhat reduced the opportunities for private meetings in the evenings, although on several evenings most participants met for formal social occasions. One of these was the showing of the film on Pugwash, which was commissioned by the Czechoslovak Academy of Sciences and presented by them to the Continuing Committee. To those who participated in the Karlovy Vary Conference it brought back vividly the serious and light moments at that Conference, as well as recalling the early history of Pugwash.

The programme of the meetings was again slightly different from that at previous conferences. The first session on the Sunday morning was a formal opening to which outside guests and the press were invited. Two members of the Italian Government, the Minister for Scientific Research and the Under Secretary of State for Foreign Affairs, as well as the Mayor of Venice and the Director of the Fondazione Cini, addressed the Conference. After this ceremonial session, the Conference got immediately to work in five working groups. The only plenary sessions were held on Thursday, 15th April, when reports of the working groups were read and discussed. On Friday, the last day of the Conference, the working groups met again separately to amend their reports in the light of the suggestions made at the plenary sessions, and to prepare the final reports.

A feature of this Conference was the large number of joint sessions of the working groups, particularly groups 4 and 5 discussing Vietnam; on one occasion three working groups met together to discuss the proposal of an International Year for the Preparation of Disarmament. These joint sessions were particularly useful at this Conference, which for the first time dealt with two separate subjects: international co-operation in science (working groups 1,

2 and 3) and disarmament problems (working groups 4 and 5). The report of the Study Group on Biological Warfare, which to a certain extent embraces both these subjects, had also a good effect in this respect, quite apart from its intrinsic importance.

The dangerous situation in Vietnam has naturally cast a heavy shadow on the whole Conference. It was inevitable that this issue be discussed at length, perhaps to the detriment of the progress made on other problems. However, the discussions on Vietnam in the joint sessions of the working groups were most instructive. The final statement agreed by the Conference, and which for obvious reasons had to be non-committal, hardly does justice to the earnest and thoughtful exchange of views at these meetings, and to some specific schemes suggested for the solution of the Vietnam problem. Perhaps the important part of the statement on Vietnam is the last sentence in which members of the Conference are asked to convey to their governments the different opinions expressed.

By contrast with the working groups on disarmament, the working groups on international co-operation in science found very little of controversial substance and the Continuing Committee decided that the full text of the reports of working groups 1, 2 and 3 should be made public. The reports of working groups 1 and 2 appear in this issue, and that of working group 3 will be published in the next issue of the Newsletter.

As usual the smooth running of the Conference was the result of the considerable effort put in by the host country. ProfessorsB. Bertotti and G. Giacometti were mainly responsible for the organization of the secretariat in Venice. The Italian Organizing Committee, with Professor G. Bernardini at its head, managed, after some initial difficulties, to secure funds to offer hospitality to many of the participants, thus continuing the tradition established at earlier conferences.

STATEMENT

on the 14th Pugwash Conference on Science and World Affairs

issued by the Continuing Committee

The 14th Pugwash Conference which was held in Venice from the 11th to 16th April, 1965, was attended by 77 scientists and scholars from 20 countries. The agenda was concerned with two main topics: international co-operation in science, and problems of disarmament. The Conference also considered problems relating to the situation in Vietnam. The discussions have been held in five working groups which submitted their reports to the Conference as a whole. In addition, the Conference received a report from a study group on biological warfare which met in Trieste prior to the Venice meeting.

This statement has been drawn up by the Continuing Committee on the basis of the reports from the above groups.

A. National, Regional and International Institutes

In view of the tremendous advances which have taken place in science and technology it is clear that, even at our present level of knowledge, it is possible to transform radically the standards of living in the developing areas of the world in a few decades. It is of vital importance that there is an understanding of this in the

developing nations so as to generate an atmosphere of confidence in the future. It is also of the greatest importance to create soon an objective approach to all aspects of human endeavour, an approach which follows immediately from the development of science.

An important component in the growth of science in the developing countries is the creation of national scientific cadres. The immediate task in these areas is the transfer of existing scientific knowledge (with necessary adaptation to local conditions) and its application to ensure rapid economic growth. The major effort of the national cadres should be on task-oriented programmes with defined time scales for their accomplishment, Fundamental research, however, needs to be supported strongly to ensure balanced development; this is true also for the advanced countries.

The limited resources in finance and skilled manpower can be best utilized in a few centres of high quality at national level. Regional and international institutions should have lower priority, wherever the creation of national institutions is feasible.

These few centres for research and development should be strongly associated with teaching, either by being part of existing universities, or by developing into university-like institutions; if for specific reasons centres purely for research have to be set up, very good co-ordination between them and the universities should be ensured. Regional-international-type institutes can be of great value, since they can utilize materials for study and research which are most readily available in their regions; their studies can cater for the scientific objectives of the regions and thus be directly beneficial to them.

International institutes for research should be set up only if they fulfill scientific needs which cannot be catered for by national centres for reasons of cost, skills, location, etc. Such institutes should have only a small permament staff and establish strong two-way relationships with universities and other national centres, so that scientists can be cycled continuously through the international centres, and large numbers can thus benefit from the excellent facilities set up for all.

These institutes should not develop into centres of attraction to drain away permanently the best brains from universities. This is also true for national centres which are set up to carry out research only. The international institutes should have a simple, flexible organizational and administrative structure and be essentially run by working scientists.

International scientific expeditions such as the International Indian Ocean Expedition, can serve a very important function and be particularly valuable to the developing areas, since they do not drain away the best scientists from these areas, while contributing to scientific development and economic growth of these regions and to further international co-operation.

B. Problems of International Co-operation in Science

The Working Group welcomed the activities of groups of scientists in several countries in connection with the International Co-operation Year, and appealed to scientists everywhere to expand such efforts.

The Group discussed the state of the International Biological Programme and recommended that the U.N., its agencies and the Expanded Technical Assistance Programme assist scientists from developing countries to increase their participation in the Programme, and that Pugwash National Groups urge their governments to

support the I. B. P. projects, including expeditions and the organization of centres for the collection, analysis and publication of the assembled data.

The Group discussed the problem of storage, retrieval and analysis of scientific data, and noted the interest of the International Council of Scientific Unions (I. C. S. U.) and U. N. E. S. C. O. in the field. It made several recommendations to these groups, including the establishment of an international code of practice for the publication of scientific papers and abstracts, a unified international system for coding the contents of scientific publications, and the elimination of wasteful duplication of abstracting efforts in different countries. The Group hoped that initial co-ordination will pave the way to the creation of an international centre of scientific information. The activities in this field should include not only collection of data, but also their analysis and presentation, much of which can be now done by computers, and the preparation of compendia.

The Group recommended that at the forthcoming Pugwash Conference in Addis Ababa, a Working Group be set up for the study of problems of population growth and of the resources needed to take care of the growing population. The Group suggested that the World Health Organization, Food and Agricultural Organization, and U. N. E. S. C. O., as well as natural and social scientists in both developed and developing countries, increase their concern with the biological (including clinical), social, educational and economic aspects of the problems of human populations and resources.

Noting that the U. N., its agencies and non-governmental organizations such as I. C. S. U. are now increasingly concerned with co-operation in science as a contribution to the establishment of stable peace, the Group believes that these activities should be further increased. It recommended the establishment of an International Science Foundation, to help scientists of countries not able to support adequately scientific research. This Foundation should support, on the basis of achievement and promise, individual scientists rather than nations or programmes. The necessary funds might be provided by the International Bank for Reconstruction and Development, as well as by other sources, and the Foundation could be established under the sponsorship of U. N. E. S. C. O.

The Group noted the establishment by the U. N. Economic and Social Council of a Scientific Advisory Committee on the Application of Science and Technology to Development and recommended that the Pugwash Continuing Committee explores (a) the possibilities of better liaison of this Advisory Committee with the scientific communities and (b) the possibility of improving the U. N. machinery for co-operation in science and technology in areas not covered by the E. C. O. S. O. C. Advisory Committee.

The Group recommended that steps be taken by the U. N. to set up an International Institute for Technical Economics; it reaffirmed an earlier Pugwash resolution recommending the establishment by U. N. E. S. C. O. of an Institute for Natural Resources Analysis.

The Group welcomed the establishment of an Institute for Peace Research in Sweden and suggested that its programme should be concerned with the pre-conditions for the establishment of stable peace in a society revolutionized by science and technology; and that both social and natural scientists should participate in these studies.

C. International Co-operation in Science Education

In a world of rapidly accelerating change, brought about through science and technology, general education must be concerned with the adjustment of men and of societies to change. It must concern itself, among other things, with the role of science in human life, and also with the nature of scientific investigation itself. Scientific knowledge is now doubling every 10 to 15 years. The useful lifetime of most scientific textbooks is about that of an automobile (5-10 years), and the obsolescence of a teacher of science, lacking renewal of training, covers about the same span of time. Enlightened public policy will, therefore, implement efforts to improve science curricula and extend the training and renewal of training of science teachers.

It follows that the task of revising and reforming our educational programmes and methods is urgent and needs to be continuous. In this task international co-operation is particularly needed.

The future progress of science depends upon effective education in science, fully as much in the secondary and elementary schools as in the universities. More attention must be given by scientists to revising and reforming the science curriculum in order to keep it sound and broadly based, yet flexible and experimental in nature.

The simplest and least expensive form of international co-operation in science education consists of two steps:

1. The development of mechanisms for prompt transmission and free use of the products of curriculum studies prepared in one country by interested groups in other countries; and

2. The payment of expenses to enable experienced personnel from one country to work with active science education groups in other countries in sessions of some weeks to months in duration.

The developing countries have special problems in this area because of their great shortage of trained scientists and science teachers. Regional groups of such countries may profitably unite in developing new science courses for the elementary and secondary schools.

The Group recommended that the pilot projects of U. N. E. S. C. O. in Brazil (physics), in India (Chemistry) and in Africa (biology) be pushed with speed and urgency, and be extended as soon as possible on a more comprehensive scale, and that further study be devoted to science education in the next and later Pugwash Conferences.

A greatly reformed training of science teachers and their retraining at periodic intervals by means of specially planned institutes, seminars and summer courses, are necessitated by the rapid advancesof science itself. We emphasize the great importance of breadth of training, especially for elementary and secondary school teachers; and equally emphasize that the sciences must be integrated in general education. The relations of the sciences to the humanistic and social studies must be stressed.

The Group recommended that U. N. E. S. C. O. and other agencies be asked to form a permanent study group to devise such measures and to communicate them to all governments. It also recommended

more vigorous action to support joint studies and programmes relating to the training and renewal of training of science teachers.

The recruitment of science teachers is inadequate in all countries, and in some countries is desperately low. In nearly all countries teachers are seriously underpaid. Better salaries, leading to higher social standing, and a reduction in the daily load of classes and subsidiary duties may be recommended. In the developing countries, where science teachers are in very short supply, corps of teachers acquainted with modern methods of science teaching and curricula should be organized on a multinational basis to assist in teaching and in training of teachers.

Human society is based on utilization of a diversity of types of individuals. There will be no peace among nations until we have learned not only to tolerate but in fact to esteem these differences between ourselves and others. The study of science is particularly able to teach the lessons of tolerance. Science itself is international in scope and cannot flourish in secrecy.

The Group believes that in a peaceful, disarmed world, education will have the first priority in the budgets of the nations and first claim on the quality and quantity of manpower.

The Group believes that even now all nations should reconsider their apportionment of funds and manpower and allocate far more to education.

As disarmament proceeds, the liberated funds now devoted to military defence should be shifted with highest priority to the improvement of education. A generation better educated in science and in tolerance will lead mankind toward lasting peace.

D. Current Problems of Arms Control and Disarmament

1. Interim measures towards arms limitation or reduction

(a) Destruction of bomber aircraft

The Working Group considered some of the suggestions for arms limitation or reduction discussed at previous Pugwash Conferences, and reaffirmed the view that one of the measures to limit the arms race and one of the first steps of actual disarmament might be the destruction of bomber aircraft over the next few years, within an agreed period and without replacement. This could be done by an agreed sequence according to type of aircraft.

Taking into account that bomber aircraft are vital for the national security of some nations which do not possess more advanced military equipment, one could begin with the major powers.

(b) Foreign bases

The Group discussed the problem of military bases and troops on foreign territory. While there were some dissensions, the following represents the views of most members of the Group.

They agreed with the views expressed at previous Conferences that foreign troops and bases contribute to international tension, especially between the major powers, and consider that, as a step towards general and complete disarmament, all

such bases should be liquidated and all foreign troops withdrawn as soon as possible.

Having this in mind as an ultimate goal they consider that reduction in the strength and number of military units maintained in foreign bases and territories, as a step towards their gradual elimination, would make an important contribution to the relief of tension. Amongst foreign bases, those maintained against the wishes of the country in whose territory they are located have a special position. It was felt that in the first place one should reduce in strength, or eliminate, the bases in countries whose Governments have requested their abolition.

The Group considered that temporary difficulties which might arise in certain circumstances in connection with the elimination of foreign bases and troops, should be solved in accordance with the principles and provisions of the United Nations Charter.

2. Measures to relieve tension

The Group discussed the problem how to prevent small commitments of a major power in a distant area growing into a major involvement which might ultimately escalate into a major conflict, particularly in the event of civil war.

3. Extension of test ban treaty

The Group endorsed the hope expressed at the 13th and previous Pugwash Conferences that the Moscow Test Ban Treaty be extended to underground tests and to all countries, and that there be a moratorium on underground testing pending the conclusion of a treaty covering such tests. This hope has not yet been realized and, since the 13th Conference, underground tests have been carried out.

E. Problems of General and Complete Disarmament

The Working Group considered the difficulties which are standing in the way of further progress towards comprehensive disarmament and measures which should be undertaken to overcome them. The Group recognized that the conclusion of a treaty on general disarmament, under effective controls, would eliminate the problems arising from the large-scale proliferation of weapons of mass destruction, and also create an atmosphere in which it would be much easier to solve many of the political problems which are now impeding progress. On the other hand, the adoption of interim measures of arms control and reduction would not only decrease the dangers of nuclear war, but would also make it easier to arrive at a more comprehensive disarmament agreement. There was, however, a spectrum of opinions regarding the relative emphasis which should be placed at this time on the short-range measures as compared with the ultimate goal.

On the question of further proliferation and dissemination of nuclear weapons and of weapons technology, the Group reaffirmed the conclusions of the Pugwash Conference in Karlovy Vary regarding measures which should be undertaken to prevent proliferation, as well as the dangers of proliferation which arise from various schemes for nuclear sharing (as for instance the M. L. F.). The discussions elaborated on some of the Karlovy Vary proposals, most especially those relating to the guarantees which could be given to the non-nuclear nations on the part of the nuclear powers within the framework of the United Nations, to the control over

materials used in peaceful atomic energy applications, and to the types of measures which could prevent the work by experts from one country on weapons programmes in another. The Group also considered schemes for applying and strengthening the peace-keeping procedures provided for in the Charter of the United Nations.

F. Biological Warfare

The Study Group considered the consequences of the possible use of biological and chemical weapons and reiterated its concern about the danger to mankind from the further development and use of these weapons. A total ban on such weapons, as well as of nuclear weapons, must be accomplished in achieving our final aim of complete and general disarmament under strict international verification.

The dangers to world security posed by all classes of biological and chemical weapons are closely interrelated. Both in public opinion and in military practice it does not appear possible to maintain any lasting distinction between incapacitating and lethal weapons, or between biological and chemical warfare. The great variety of possible agents forms a continuous spectrum, starting from those that are temporarily incapacitating and ending with highly lethal ones. If the restraints on the practice of any kind of biological or chemical warfare are broken down, the entire spectrum of these weapons may come into use.

The Geneva Protocol of 1925 banning the first use of biological and chemical weapons was briefly discussed. The Group felt that the effectiveness of this Protocol would be greatly increased if those states which have not yet adhered to it were to do so. However, the Group wishes to emphasize its conviction that arrangements going beyond the Geneva Protocol will be needed if the development and production of biological weapons are to be avoided.

Although the problems of preventing the use of biological and chemical weapons are interrelated, the Group confined its discussion to means for preventing the use of biological weapons, because the far greater destructive potential of biological weapons qualifies them for attack on large civilian populations. The Group is of the opinion that the human destructive potential of biological weapons could, with continued research and development, eventually rival that of nuclear weapons. Furthermore, once they are perfected devastating biological weapons may be far cheaper and easier to produce than nuclear weapons, thus placing a great destructive capability in the hands of many nations.

At present there are reasons to believe that biological weapons have not been brought to a degree of perfection which would make them operational for any but limited military ends. However, a number of states are known to be working in this field. In this situation, it is important to consider means for inhibiting the further development of biological weapons. A variety of proposals for accomplishing this have been discussed.

It is hoped that a series of pilot activities will be implemented in several European countries aimed at minimizing secrecy in biological research, building mutual trust and confidence, and the conclusion of an agreement not to do research and development of biological weapons.

G. The situation in Vietnam

The participants in the 14th Pugwash Conference considered that the recent aggravation of military action in South-east Asia threatens by escalation the peace

of the world, and increases the suffering of the Vietnamese people. They think that reason and humanity should prevail.

Different views were expressed as to the origin of the conflict and the means for its settlement. All participants, however, agreed that means should be sought to achieve the earliest restoration of peace in this area; the United Nations should do everything in their power to achieve this.

It was agreed that the members of each national group will convey the different opinions expressed at the Conference to their governments.

H. The Use of Gas in War

At the instruction of a plenary meeting, a Working Group prepared the following statement:

We have discussed the dangers inherent in the use of unconventional weapons. We condemn the use of gas warfare in any part of the world.

The public response to the recent use by the United States of an agent, known in the United States as a riot-control gas, in combat in South Vietnam shows how deeply this concern is felt by public opinion.

We believe that there is much wisdom in this public reaction against even the most limited use of gas and even when the effects of such use are said to be no more than temporarily incapacitating.

There are two considerations which lead us to this belief:

1. There are gases of all grades of toxicity, running from gases with only brief effects to lethal nerve gases. But that which is only incapacitating for a healthy adult can be deadly for an infant or a weak person. Once gas of any kind is used and the various barriers to the use of gas are broken down, there is no clear line to prevent escalation to the use of the entire range of gas weapons available.

2. If weapons said to be merely temporarily incapacitating come into general use, they would be directed against civilian populations in cases when more destructive weapons would never have been used, thus civilians would become exposed to military action to which they are not now subject.

I. International Year for the Preparation of Disarmament

To focus general attention on the necessity of disarmament and on the ways in which disarmament can be safely carried out under international control, the Conference suggests that an International Year for the Preparation of Disarmament (I. Y. P. D.) be proclaimed by the United Nations and organized by the methods so successfully used in the International Geophysical Year, the International Years of the Quiet Sun and the Freedom from Hunger Campaign.

Governments should take the initiative in setting up National Committees of Preparation for Disarmament, in which voluntary organizations of all kinds should be invited to join. The Committees should promote lectures in universities, teacher-training colleges and high schools, organize public meetings, prepare suitable literature, and make full use of television, radio and other media.

The Conference suggests that a representative preparatory Committee for the holding of the I. Y. P.D. be set up in which the Pugwash Movement will take an active part.

LIST OF PARTICIPANTS

in the 14th Pugwash Conference

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Mr. H. Afheldt (F. R. G.)
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Prof. H. Alfven (Sweden)
Prof. M. Aloisi (Italy)
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Dr. P. V. Andreev (U. S. S. R.)
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Prof. L. Infeld (Poland)
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Dr. M. Kaplan (W. H. O.)
Prof. A. Keynan (Israel)
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Mr. J. Lestel (France)
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Prof. O. Maaløe (Denmark)
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Prof. I. Malecki (Poland)
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Dr. H. Marcovich (France)
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Dr. D. C. Martin (U. K.)
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Mr. J. Moch (France)
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Mr. P. J. Noel-Baker (U. K.)
Mr. V. P. Pavlichenko (U. S. S. R.)
Prof. R. E. Peierls (U. K.)
Mr. J. H. G. Pierson (U. N.)
Dr. S. Prawirohardjo (Indonesia)
Mr. J. Prawitz (Sweden)
Prof. E. Rabinowitch (U. S. A.)
Mr. V. Rabinowitch (U. S. A.)
Prof. R. Revelle (U. S. A.)
Prof. B. V. A. Röling (Netherlands)
Prof. P. Rosenstiehl (France)
Prof. R. Rollefson (U. S. A.)
Prof. J. Rotblat (U. K.)
Prof. M. Rubinstein (U. S. S. R.)
Prof. L. Sohn (U. S. A.)
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Prof. I. Supek (Yugoslavia)
Sir Gordon Sutherland (U. K.)
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Prof. M. S. Voslensky (U. S. S. R.)
Prof. B. M. Vul (U. S. S. R.)

In addition, the following took part in the meetings in Trieste only:

Prof. B. de Bernard (Italy)
Dr. C. -G. Héden (Sweden)
Prof. G. Maccacaro (Italy)
Dr. K. Raska (Czechoslovakia)

14th Pugwash Conference on Science and World Affairs

Venice, 11th - 16th April, 1965

REPORT OF WORKING GROUP 1

NATIONAL, REGIONAL AND INTERNATIONAL INSTITUTES

A. The role of research institutes in the advancement of science with particular reference to the developing countries

Before recording our views on this problem, we feel it would be of value to make the following general observations:

The problem of the development and organization of scientific research is an important but complex one. It is a problem to which Pugwash Conferences could devote attention with profit. Detailed solutions to this problem will differ from country to country, since the various areas represent a wide and heterogeneous spectrum in terms of development, size, resources, etc.

In the case of the developing areas there are two basic factors which need to be emphasized. First, because of the tremendous advances which have taken place in science and technology, it is clear that, even at our present level of knowledge, it is possible to transform radically the standards of living in these areas within the course of a few decades. It is of vital importance that there is a proper understanding of this possibility in the developing nations, so as to generate an atmosphere of confidence in the future and to release the tremendous latent energies for development. Secondly, it is of the greatest importance to create soon an objective approach to all aspects of human endeavour, an approach which is part of the scientific method, and immediately follows from the development of science.

Since, on the one hand, the social, economic and scientific transformation in the developing areas need to take place at a rapid rate and, on the other hand, the development of science is also very rapid, the problems of priority, organization of research in these areas and questions of like nature, will continue to engage the attention of future Pugwash meetings.

An important component in the growth of science in the developing countries is the creation of national scientific cadres. Since the immediate task in these areas is the transfer of existing scientific knowledge (with necessary adaptation to local conditions) and its application to ensure rapid economic growth, the major part of the national cadres should be occupied with task-oriented programmes, with defined time scales for accomplishment; these programmes involve both research and development.

Basic, fundamental research, which is the mainspring in the development of science and technology, should be also supported to ensure a balanced development. The orientation of the research programmes and the relative support to be given to different fields will depend on a scientific assessment of the national needs. It would indeed be unfortunate if the developing areas were to have only a derivative scientific culture borrowed from the advanced countries. The question we face is whether two-thirds of mankind will have to depend for many decades to come on the creative achievements of the most

advanced countries. We believe that it is our task in the Pugwash Movement, as scientists, to find means whereby all nations can be given a chance to participate in scientific development.

Indeed, in all countries, basic research in many areas is the starting point for adapting the newest achievements in technology to the local needs. If teaching in the universities is not to become routine and unexciting, it is vital that significant and essential research be carried out at the very frontiers of man's knowledge. Such research alone can generate the excitement and the spirit of penetrating, independent inquiry.

We refer to scientific research in its broadest connotation; we include social sciences and such research which can be of fundamental significance in the transformation of traditional societies to the new world opened up by the scientific revolution.

We shall now consider the various aspects relating to research institutes of different types. We believe that they can play an important role in development, provided the following guidelines are observed:

1. Since in general, both financial resources and skilled manpower are limited, national institutes should be given the highest priority, next should come regional, and finally international institutes. Again, within a country the available resources would best be utilized in a few centres of high quality. The advantages of having only a few such centres in a country, rather than in distributing the same resources over a wide base, are fairly obvious. Firstly, in modern scientific work groups have to be of a minimum critical size to be viable and to propagate; that critical size depends on the type of work being undertaken. With groups of a size smaller than the critical value there is always a feeling of isolation from the mainstream of scientific development. Secondly, even with limited resources, it is still possible to equip a few centres with equipment and facilities of the quality and variety needed for scientific work.

2. These centres for scientific research and development should preferably be associated with universities, both those that already exist and those yet to be established. It may not always be possible to develop such centres for research in existing teaching institutions, because of the archaic and rigid administrative and organizational structures which such institutions have often inherited from a bygone era. A possible solution would be to create new centres of excellence, which would carry out research and teaching from the very beginning; or if they begin as pure research centres, they should undertake teaching also in due time. We believe that the close juxtaposition of advanced teaching and research has a profound uplifting influence on both aspects.

3. Regional and international institutes can be of value for a variety of reasons. We have considered the principles which should govern the establishment of international research institutes and this is dealt with later in this report. The distinction between regional and international institutes can be only drawn on the basis of the objectives of the institutes. For the developing nations, the location of such institutes is very important. It is obvious that much larger numbers of scientists can benefit from an institute located in their own country or nearby, whilst few can be sent great distances to advanced countries, where travel and maintenance expenditures can be unnecessarily large. Regional institutes will always have the built-in tendency to cater for the needs of the region in terms of scientific objectives. For example, in the case of research institutes on parasitology and on the physiology of re-

production, proposed in connection with the World Health Research Centre, it is clear that they should be regional and located in areas where materials for study and research are most readily available; they should in fact be in regions which will benefit most from these studies and therefore have the greatest interest in their success.

4. It is not always easy to persuade scientists from advanced countries to spend some of the most productive years of their lives, for extended periods of time, in national or regional institutes located in the developing areas of the world. Pugwash Conferences could undoubtedly play an important part in convincing scientists from the advanced countries about the great importance of making some sacrifices in this direction. We believe that the establishment of strong national and regional institutes, with their own well-established reputations and facilities, can prove to be a positive factor and a genuine focus of attraction to achieve this objective. Regional or national institutes working on problems for which the basic materials are in fact best available in the developing areas are well placed in this regard, provided that scientists from the advanced countries are particularly interested in these materials from the purely scientific point of view.

5. In those areas of science in which only very limited numbers of scientists from the developing areas work, international institutes can be located in advanced countries and the developing areas can benefit from these. These institutes have the advantage that scientists from advanced countries can be persuaded to work in them without any sacrifice. They should, however, possess such a character that the scientists from developing countries would feel genuinely that they properly belong there.

6. An important point of view to be emphasized in connection with national, regional and international institutes is that they should not constitute centres of attraction which drain away the best brains from all other areas of endeavour. They should be centres of high quality with two-way relationships with a variety of other local institutions; there should be a continuous cycling of scientists through these research centres, so that the excellent facilities they possess can benefit the largest possible numbers and reduce the problem of "scientific isolation."

B. Principles governing the establishment of International Research Institutes

Until about 1950 only a few international institutes had been created for scientific research. Possibly the earliest was the Bureau International des Poids et Mesures (B. I. P. M.), established in Sevres about 1875, for research on physical standards. Other examples are the High Altitude Research Station on the Jungfraujoch and the Biological Research Station at Naples. The B. I. P. M. is a truly international institute in that it is financed and governed by a Bureau whose members are drawn from all the signatories of the Metric Convention; the other two are semi-international institutes in that the host country took the initiative and bears most of the cost, but the governing body may contain representatives from other countries which can contribute to the cost of the institute. Such institutes welcome able foreign scientists who wish to make use of their special facilities.

Since 1950 several international institutes (or organizations which control research institutes) have been created, e. g. European Institute for Nuclear Research (C. E. R. N.), the Joint Institute for Nuclear Research (J. I. N. R.) in Dubna, the International Atomic Energy Agency

(I. A. E. A.) (including the International Centre for Theoretical Physics in Trieste), the European Space Research Organization (E. S. R. O.) and the European Launcher Development Organization (E. L. D. O.), while others are being planned or prepared, e. g. the World Health Research Centre, European Molecular Biology Organization, the Swedish Peace Research Institute, etc. Indeed, the success of C. E. R. N. in the field of high energy nuclear physics has been so great that there appears the tendency to create international centres of research in any subject, in the hope that the success of C. E. R. N. will be repeated. It is timely, therefore, to consider whether there are some general principles governing the establishment of international research centres in the light of the experience gained from the operation of those now in existence. Our discussions have led to the following conclusions:

1. There must be a clearly demonstrated scientific need for the international status of the research centre. The following examples will illustrate this.

(a) C. E. R. N. provided experimental facilities for research in high energy nuclear physics which were beyond the capability of any European country except the U. S. S. R.

(b) Similarly, E. S. R. O. and E. L. D. O. will provide facilities for space research for the same European countries.

(c) In the application of atomic energy I. A. E. A. provides facilities for the developing countries which no one country will be likely to undertake.

(d) The proposed World Health Research Centre, especially in the fields of epidemiology, and in communication science with regard to health and biomedical information, has clearly defined scientific needs that could not be met by national efforts alone.

(e) B. I. P. M. provides an impartial and excellent centre for research on standards which must receive international acceptance by the whole world.

(f) The Jungfraujoch Station provides facilities not available in countries like Britain, Belgium, Holland, etc. and which would be wasteful to duplicate in Germany, Austria or Italy.

Thus the international status can be justified on the bases of cost, function or location.

2. The Institute should not have a large permanent staff of scientists.

The Institute will serve its function best if the great majority of the scientific staff spends from 1 to 3 years there, returning to their native countries where facilities should be provided for them to continue some aspects of that type of research at the same level of sophistication. The experience of C. E. R. N. is that the countries which gain most from C. E. R. N. spent about 4 times as much in their corresponding national programmes as they contribute to C. E. R. N.

3. The organization and administration of the Research Institutes should be as simple and flexible as possible; the essential control of the Institute should be in the hands of the senior working scientists; this is the experience and pattern of C. E. R. N.

When control passes into the hands of international administrators, or decisions are governed by commercial or diplomatic considerations, serious and frustrating difficulties can arise.

4. The institute should form links with neighbouring universities or large national institutes operating in the same field, so that personnel can be exchanged for short periods.

Otherwise, isolation and gradual degeneration will be hard to avoid.

5. It is usually wise to create an international research institute by building and extending the scope and function of an existing national institute.

Not only does this avoid the difficult problem of choosing the country in which the new institute is to be located, but it provides an incentive to countries to create institutes with international potentialities on their own initiative. J. I. N. R. Dubna originally consisted of two national U. S. S. R. institutes which were put together with additional facilities to constitute an international research institute. Also, the proposal for the Swedish International Peace Research Institute is a good example in this regard. It is to be hoped that some of the developing countries might take the initiative in creating such institutes in which they could offer special attractions for research in branches of science in which they might possess particular advantages (e. g. the U. A. R. Aswan Institute of Development Technology).

We believe that the preceding considerations will be useful to those concerned in the establishment of new international research institutes in science.

That such institutes serve a most valuable function in promoting better understanding between nations and a spirit of co-operation rather than blind national rivalry can hardly be doubted. The help which such institutes can give to science in the developing countries can also be very real if the particular requirements of the developing areas are borne in mind.

International Expeditions

Finally, we would endorse strongly an expansion in the number of international expeditions, especially when these are concerned with the exploration of natural resources in the developing countries.

International years such as the International Geophysical Year and the International Quiet Sun Year (which is in progress) have been organized as international co-operative efforts for the advancement of science. They have undoubtedly led to greater international understanding. We believe that the organizing of international scientific expeditions in the developing countries serves a similar purpose within a precisely defined framework.

Such international expeditions might be organized at the request of the developing countries concerned and then be undertaken by co-operation between them and the developed countries. Their purpose and programme can be comprehensive or relatively specialized. The expeditions can be sent out for a specific period, or seasonally, or sporadically, as desired by the countries concerned, and can be financed from various sources, e. g. the host countries, countries that wish to contribute, U. N. E. S. C. O., etc. We warmly welcome the initiative taken by U. N. E. S. C. O. and the International Council of Scientific Unions (I. C. S. U.) in the past in this regard.

In international expeditions, the problem of a scientist from a developing country not wanting to return home does not arise. In the course of the expedition the scientists of the developing countries can acquire extensive practical training and knowledge if, in connection with the expeditions, seminars or summer courses are organized. Scientists in the developed countries have indicated a

genuine interest in taking part in such expeditions, especially when the problems to be solved are of a global nature.

Another factor to be taken into account is that the expedition encompasses people from different social groups: manual labourers, technicians and scientists.

The International Biological Programme (I. B. P.) and the International Indian Ocean Expedition (I. I. O. E.) are two excellent examples of what we have in mind. The I. B. P. has been considered and warmly endorsed by the 13th Pugwash Conference at Karlovy Vary. The I. I. O. E. will lead to a better scientific understanding of the various geophysical and biological aspects of the Indian Ocean region, and by so doing enable a better exploitation of natural resources (fisheries etc.); most of all, through the processes of education and collaboration, it will enable countries in that region to initiate and develop programmes of this nature in the future, through which they can contribute to scientific advancement, as well as to their own economic growth.

C. Problems concerning the relations between universities and large scientific institutions

At the 13th Pugwash Conference, Working Group 5 made the following comment: "Among a number of important themes we may mention the following ... Problems of the proper relation between centres of higher learning in particular countries, on the one hand, and regional and inter-national centres for scientific research on the other hand; how to prevent the weakening of our universities through loss of too many of the most able young people to the research Centres. Such centres are at present few but, in many disciplines, the growing needs in gifted men and resources required for significant investigations is likely to lead to their rapid increase."

We believe that this is a real and important problem affecting many countries and we present here our views on this.

Large scientific institutions have been set up, in increasing numbers, particularly since the last war, outside universities and other existing centres of learning for various considerations, e. g.

(a) to ensure rapid development in certain areas;

(b) to undertake specific technological tasks;

(c) to enable the concentration and the most rational use of expensive equipment and available personnel.

It was felt that it would be difficult to achieve this within the existing framework of the universities.

The establishment of such large, relatively independent scientific institutions has indeed been of great value in accomplishing these objectives. At the same time the task of teaching at an advanced level the younger generation of scientists has been the responsibility of the universities. It is generally agreed that to carry out this task on any reasonable basis, the universities should undertake a substantial amount of scientific research. However, the fact that scientific research is carried out through two fairly independent channels, the large scientific institutions, on the one hand, and the universities on the other, has raised questions concerning the ideal relationship between these two.

A clear separation between them with little contact or interplay, is clearly undesirable for the following reasons:

(a) Universities have traditionally been both teaching and research centres.

In those fields where the conditions have not been created at the universities, either for research or for university participation in the research projects of the corresponding institutes, university curricula have tended to become too abstract and out of date.

(b) When the universities have created their own laboratories, analogous to those already existing in the institutes, difficult problems of co-ordination and of the rational distribution of funds and equipment have arisen. Under these circumstances wasteful duplication of research is hard to avoid.

(c) The institutes which are isolated from the universities have difficulties both in recruiting their share of the most gifted students for scientific research, and in co-ordinating the work of their students for the doctorate degree at the university with their research at the institute.

(d) Being relatively well supported, and thereby being able to offer especially good facilities, the institutes tend to be centres of attraction. This has often led to a brain-drain from the universities and/or to an excessively quick growth of personnel, not always of the highest calibre.

(e) In the case of scientists working at the large institutes on special research projects for long periods of time, without contact with scientists working in other fields and without contact with students, there is a real danger that they will become narrow-minded experts with little understanding or appreciation of the broader theoretical and historical context within which alone the particular scientific results can be seen in their full significance.

It is our view that the separation and consequent isolation of the universities and the institutes from each other could be prevented and/or overcome by some of the following measures:

(i) Developing countries should, as far as possible, give priority to the creation of reasonably well equipped modern universities rather than the immediate and simultaneous creation of universities and isolated sets of scientific research centres. The only way to get full benefit from the best qualified personnel who have studied and worked abroad is to create possibilities for them both to teach and do research in their own universities; it is only through teaching that the national requirements for ever in-increasing numbers of trained personnel can be met. In experimental sciences facilities for research could be set up with minimum outlay through the creation of national or regional laboratories, closely connected with the universities.

(ii) In at least some countries, the existing universities, while fulfilling a useful function, would be unable, within the foreseeable future, to provide the combination of research and systematic teaching, which is the essence of a higher education for the ablest young people. In these countries, it may be necessary to create new universities around existing institutes of high quality and broad range.

(iii) A considerable increase of short-term grants should be provided by the big institution, or by the universities, for students and young scientists to go from the universities

to the institutes and then to return to the universities. More funds should be available to cover the expenses for staff members, both of universities and research institutes to commute between those institutions.

(iv) A policy for a periodical revision of the standard and content of universities courses should be undertaken (with some international help), to enable young scientists trained at the universities to appreciate the specialized institutes and to put pressure on the universities to assimilate the new developments. It is also necessary that the big research institutes undertake some teaching responsibilities which could be mostly at post-graduate level.

(v) As mentioned previously in connection with international institutes, the essential control of national institutes should be in the hands of the senior working scientists.

We would like to urge strongly that when consideration is given to schemes for setting up very large institutions for scientific research, equal consideration be given to various other possibilities, such as expeditions, summer seminars and schools, exchange programmes, finances for visitors and fellowships, smaller research institutions, etc., which might, with much smaller outlay, satisfy the same objectives.

REPORT OF WORKING GROUP 2

PROBLEMS OF INTERNATIONAL CO-OPERATION IN SCIENCE

1. International Co-operation Year 1965

We received reports of a number of projects started by scientists in several countries under the initiative of national I. C. Y. committees. We feel that the Year could be used best to increase the awareness to the international co-operative effort in science, and to survey existing international co-operation programmes, both at the governmental and non-governmental level. Such surveys should be critical and serve to assess which of the programmes should be accelerated, and the ways in which they could be improved. We welcome the information that U. N. E. S. C. O. is conducting a world-wide survey on international co-operation in all areas of its competence. We are gratified by the initiative by scientists in this direction and request all Pugwash groups to make efforts in the study of possibilities for furthering programmes.

2. International Biological Programme

We considered the present status and future plans for the International Biological Programme. We are convinced that this programme represents one of the most challenging and urgent opportunities for international scientific co-operation in our time. The extraordinary importance of the I. B. P. comes from its basic theme: the study of the biological potentialities of the earth to meet the future needs of human beings, and of the ways in which men are affecting these potentialities by their own actions. These problems must be studied on a world-wide basis and they require, therefore, the closest co-operation among scientists in many countries.

Despite the great significance of the International Biological Programme, the financing of its further development

is seriously deficient, especially for the scientists and scientific institutions of the developing countries. We recommend therefore:

(a) that the United Nations, the U. N. specialized Agencies, the Special Fund and the Expanded Technical Assistance Programme consider ways in which they may assist scientists and students from the developing countries to increase their participation in the International Biological Programme.

(b) that members of the Pugwash Movement join their fellow scientists in urging individual governments to give support to projects, including expeditions, which form an integral part of the I. B. P. Such support needs to include not only the period of experimentation and collection of data, but also the even more important steps of analysis, working out of the results, and publications. Unless these final steps are adequately supported, the monies spent for investigation and data collecting will be largely wasted.

3. Storage and Retrieval of Information

Working Group 5 of the 13th Pugwash Conference on Science and World Affairs held at Karlovy Vary recommended that "work be initiated without delay towards developing a unified and co-ordinated system of scientific information storage and retrieval from the heterogeneous and limited beginnings that now exist."

We note with approval the interest of U. N. E. S. C. O. and other U. N. agencies in the problems of scientific documentation and are particularly pleased that the I. C. S. U. is creating a group of qualified scientists to study the growing documentation problems and to make recommendations in conjunction with U. N. E. S. C. O., concerning steps which might be taken to alleviate the rapidly increasing difficulties. We noted that the different scientific disciplines one by one reach the stage in which a compelling need is felt for developing advanced systems for the handling and analysis of data of all kinds.

We bring to the attention of these groups the following points:

(a) The need for an internationally agreed code of practices for the publication of scientific papers and abstracts.

(b) The need for increased coverage by abstracting journals.

(c) The need for elimination of wasteful duplication of effort in the preparation of abstracts by various bodies throughout the world.

(d) The desirability of further rationalization of abstracting services and retrieval procedures through increased use of mechanized processes.

(e) The desirability of widespread production of directories to national information services, research facilities and data centres.

(f) The development of a unified international system for coding the contents of scientific publications.

(g) The need for international co-ordination of research and information in the field of documentation carried out jointly by scientists and documentation experts.

We suggest that I. C. S. U. should follow very closely the developments in the few existing centres for data handling and that reports be circulated to member unions to keep them informed of the progress made and of the cost involved in the establishment of new, specialized data centres. Such a step would help in co-ordinating future activities; in addition it might prevent the setting up, prematurely, of small national centres that eventually would have to be abandoned or completely reconstructed.

Hopefully, as the co-ordination of the activities of existing national information centres improves, the way will be paved for the creation of a truly international centre for storage and retrieval of scientific information.

We are also pleased to learn that the I. C. S. U. is now creating a permanent committee to co-ordinate existing national efforts on the compilation of compendia of critically evaluated scientific data and to encourage new compilation efforts where necessary. We hope that this co-ordination effort expands rapidly.

Numerous scientific bodies, both governmental and non-governmental, collect, store and disseminate some limited types of data and exchange them internationally. Typical of these are the World Data Centres established by I. C. S. U. for the orderly storage and distribution of geophysical data obtained during the I. G. Y. and subsequent related international programmes. With the development of high-speed large capacity computers it has become possible for these Centres to do much more with the data they receive. Recent experience shows that the computers can be used to apply statistical methods to evaluate the accuracy of data, to detect mistakes and inconsistencies, and to sort, recombine and present the data in any desired way.

We urge the U. N. specialized agencies, the member-governments and I. C. S. U. to review the conditions of data centres in the various scientific and technical fields to ensure that these centres have adequate staff and access to computing facilities, to see that the fields of different centres are sufficiently broad, both geographically and in subject matter, and to stimulate the international exchange of evaluated and processed data, as well as the numerical data as collected.

4. Comprehensive study of population and resources

The world population of human beings is increasing at a rate of more than 2 per cent per year. In some countries the rate of increase is more than 3 per cent or even 4 per cent per year; the populations of these countries would, at this rate, double in 23-17 years.

The political, economic and social consequences of these rapid rates of population growth, the very high proportion of children and adolescents which they entail, and the means for increasing resource utilization at a rate sufficient to balance population growth, are not well understood scientifically. There are considerable differences of opinion among scientists of different social systems and cultural backgrounds.

We are convinced that these differences are at least partly based on a lack of scientific knowledge.

A scientific analysis of the problem of population and resources could serve as an important factor for social and economic progress in many countries. Taking into account the ways in which these problems have on many occasions been misunderstood, and the wide differ-

ences of scientific popular opinion, it would serve a useful purpose if at a future Pugwash Conference a special working group were set up to consider these problems. It would, however, be essential to prepare and distribute in advance adequate studies and background papers. The purpose of these papers should be to present the different aspects of these very complex problems. If possible, the materials and conclusions of the U. N. Conference on population problems, to be held in Belgrade in September 1965, should be considered in preparing the background papers, and the basic materials of this Conference should be made available to the working group.

We recommend therefore:

(a) That at the forthcoming Pugwash Conference in Addis Ababa a working group be convened to discuss the problems of human population and resources, and that special efforts be undertaken to prepare in advance an adequately broad background of information and concepts for the consideration of this working group.

(b) That the U. N. and its specialized agencies, particularly the W. H. O., F. A. O. and U. N. E. S. C. O., greatly increase their respective activities relative to the biological, social, educational and economic aspects of the problem of human populations and resources throughout the world.

(c) That natural and social scientists of both the developed and the developing countries increase their concern with population problems, and wherever possible stimulate research on the biological (including clinical), sociological, educational and economic aspects of these problems.

5. International Scientific Foundation

Recognizing the importance and the ever-increasing influence of science and technology in human affairs, and of constructive co-operation in science as a contribution to the establishment of stable peace, we urge that financial support for scientific research be considerably increased. We emphasize the urgent need for early practical action in developing countries.

We noted with great satisfaction the expanding activities of the International Council of Scientific Unions and its member unions, the considerable expansion that is taking place in the scientific work of U. N. E. S. C. O., and the beginning that is being made by the U. N. Economic and Social Council's Advisory Committee on the Application of Science and Technology to Development.

In expressing good wishes for the success of the efforts of the Advisory Committee, we hope that steps will be taken to make its activities better known. We suggest to the Pugwash Continuing Committee:

(a) to explore with representatives of the Advisory Committee further ways of strengthening the programme of international co-operation in science and technology for economic and social development proposed by the United Nations General Assembly.

(b) to discuss with U. N. E. S. C. O. and other appropriate governmental or non-governmental organizations the possibilities for improving the machinery for international co-operation in science and technology also in areas not covered by the terms of reference of the E. C. O. S. O. C. Advisory Committee.

We hope that the Continuing Committee will be able to report progress on these proposals to the Conference in Addis Ababa.

Noting these hopeful developments, we conclude that the establishment of a U. N. Council for Scientific Co-operation should not be pursued at the present time.

We believe that high priority should be given to largely increased assistance of scientific and technological research in countries where no sufficient support for such research is available now. This could be achieved, in addition to increasing such support from international sources and from the existing U. N. organizations, also by establishing, probably under the sponsorship of U. N. E. S. C. O., an International Science Foundation, to assist scientific projects and especially individual scientists of promise (selected solely on the basis of scientific merit by panels of experts). Funds for the proposed International Science Foundation might be provided by the International Bank for Reconstruction and Development, as well as from other appropriate sources. We suggest that the Continuing Committee approaches the U. N. with the proposal to set up the International Science Foundation.

6. U. N. International Scientific Institute for Technical Economics

Being convinced of the value of the successful application of methods of quantitative analysis to the solution of technical problems of efficient allocation and utilization of economic resources, and of the contribution to prosperity and peace which international collaboration in this field can make, we recommend that steps be taken by the U. N. and other interested organizations to set up an International Institute for Technical Economics, to serve as a clearing house for national organizations engaged in basic research, and engage in research on fundamental problems of its own choice. It could provide advice to countries desirous of setting up fundamental research in technical economics, and sponsor international conferences on the subject.

7. A U. N. E. S. C. O. -sponsored Institute for Natural Resources Analysis

We reaffirm the resolution of an earlier Pugwash Conference that an Institute for Natural Resources Analysis sponsored by U. N. E. S. C. O. should be created. A possible combination of this plan and that described in the preceding section has been discussed.

8. Swedish Plan for an International Peace Research Institute

At a joint meeting with Working Group 1, consideration was given to the Swedish plan for an International Peace Research Institute. After receiving reports on the activities of existing peace research institutes, of U. N. E. S. C. O. and on the proposed programme of the International Peace Research Association, suggestions for study at the proposed Swedish Institute were made. The proposal for the Swedish International Peace Research Institute is strongly supported by us and we suggest that its research programme should be concerned with the pre-conditions for the establishment of stable peace in a society revolutionized by science and technology, that the co-operation of both natural and social scientists be secured, and that the fully international character of the planned research be welcomed.

FREE TRAVEL OF SCIENTISTS

At the 13th Pugwash Conference in Karlovy Vary, Working Group 5, while discussing the problem of exchange and travel of scientists, drew attention to the special difficulties for scientists from the German Democratic Republic. In the statement issued by the Continuing Committee, this problem was referred to in the following terms:

> "Particular difficulties arise from the operation of the Allied Travel Office in Berlin which issues the travel documents needed by the scientists of the G. D. R. for travel to N. A. T. O. countries."

Prof. H. Barwich, a past participant in Pugwash Conferences, wrote to the Editor of the Pugwash Newsletter that in his opinion the above statement was not correct. He points out that the arrangement by which scientists of the G. D. R. could obtain visas to N. A. T. O. countries by applying to the Allied Travel Office (A. T. O.) in Berlin, and which worked satisfactorily for 15 years, was upset by a decision of the G. D. R. Government made in April 1962, forbidding scientists to apply to the A.T. O. Certain categories of people were subsequently allowed to apply to the A. T. O. but participants in scientific or Pugwash Conferences did not qualify for such exemption.

Prof. G. Rienäcker, the Chairman of the G. D. R. Pugwash Group, does not agree with Professor Barwich and quotes a number of specific cases which show how the operation of the A. T. O. continues to hinder scientific work. The following are a few of the 19 examples quoted by Professor Rienäcker:

(a) In July 1963 the A. T. O. refused permits to ten G. D. R. scientists invited to the Conference on Pure and Applied Chemistry in London.

(b) In October 1963 the A. T. O. refused travel documents to Professor Daber to take part in a meeting of the Council of the International Union of Geological Sciences, despite strenuous efforts made on his behalf by I. C. S. U.

(c) In May 1964 Professor von Ardenne and Professor Rexer were refused travel permits by A. T. O. to participate in a symposium on "Electron and Ion Beam Science and Technology" held in Toronto.

(d) In July 1964 Professor Rienäcker and other G. D. R. scientists were refused travel documents by the A. T. O. to participate in the International Conference on Catalysis in Amsterdam, although Professor Rienäcker personally applied to the A. T. O. three times.

FILM ON PUGWASH

The Czechoslovak Academy of Sciences has made a film on Pugwash under the title "To Be Or Not To Be", which runs for about 40 minutes. The film gives a review of the origins of the Pugwash Movement and the earlier Pugwash Conferences, based on photographs taken at these conferences, but it deals mainly with the 13th Pugwash Conference in Karlovy Vary, when many interviews with participants were filmed and pictures taken at the opening session,

excursions and barbecue. The film will be very valuable as an introduction of Pugwash to scientists and other groups of the community, and national Pugwash groups may wish to organize showings.

16 mm copies of the film can be purchased from the Czechoslovak Academy of Sciences for £20. Those interested should write to Mr. T. Nemec, Czechoslovak Pugwash Committee, Parizska 11, Prague 1, Czechoslovakia.

PEACE RESEARCH ABSTRACTS JOURNAL

This journal is undoubtedly the best source of information on all subjects of interest to Pugwash. By arrangement with the publishers the Pugwash Newsletter will publish a selection of the abstracts, but we strongly recommend to all participants in Pugwash Conferences to subscribe to the Journal. Here is some information which was supplied by the publishers:

The Peace Research Abstracts Journal

- Gives references to papers published on every aspect of peace, war and world affairs.
- Has abstracts (average length 100-200 words) of over 80% of the references. These abstracts summarize the essential ideas of the paper.
- Contains abstracts of papers published in English, German, Russian, Dutch Polish, Czech and Norwegian.
- Contains abstracts of papers published in over 600 journals since 1945.
- Is issued monthly. First issue in June 1964. Volume I contained 10,750 references.
- A cumulative index has been published every 3 months.
- Abstracts are grouped in the following areas of interest:
  - I-The Military Situation
  - II-Arms Control and Disarmament
  - III-Tension and Conflict
  - IV-Ideology and Issues
  - V-International Institutions and Regional Alliances
  - VI-Nations and National Politics
  - VII-Pairs of Countries and Crisis Areas
  - VIII-International Law, Economics and Diplomacy
  - IX-Decision making and Communications
  - X-Methods of Study and Science & Society
- Is available only by subscription
- Subscription rates are:
  Libraries of universities, companies and other organizations - $60.00/year
  Individual subscriptions - $30.00/year
  For individuals whose organization has subscribed there is a special rate of $18.00/year.
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Peace Research Abstracts Journal is an official publication of the International Peace Research Association.
It is published by the Canadian Peace Research Institute, Clarkson, Ontario.
Subscriptions should be sent to the Co-Editors, Dr. Alan and Dr. Hanna Newcombe at 25 Dundana Avenue, Dundas, Ontario, Canada.
Volume I is for the period June 1964 to May 1965; a subscription includes the Annual Index, a Coding Manual and any special publication put out by Peace Research Abstracts. Subscribers should obtain back issues; P.R.A. Journal is modelled on Chemical Abstracts. The project has now obtained 18,000 references but still has need for volunteer abstractors.

THE CONTINUING COMMITTEE

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