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PROGRAMME OF THE 17th PUGWASH CONFERENCE

Ronneby, Sweden, 3-8 September 1967

"SCIENTISTS AND WORLD AFFAIRS"

The provisional programme for the 17th Pugwash Conference, which is expected to be the largest of the Pugwash Conferences held so far, envisages three symposia to be held at plenary sessions on the mornings of the second, third and fourth day of the Conference. The subjects of the symposia are: 1. "Arms Control, Peacekeeping and Security"; 2. "New Approaches in Disarmament"; 3. "International Co-operation and Development". Each symposium will be introduced by three keynote papers.

Plenary sessions will also be held on the first day, when there will be reports on past Pugwash activities and a discussion on "The Responsibilities of Scientists", and on the last day which will be devoted to a discussion on "The Future of Pugwash".

The rest of the time will be taken up with meetings of the working groups. Six working groups are envisaged, and their topics will include the items listed below. Each of the working groups may divide into two or more sub-groups, either discussing the same topics or taking up specific items.

The election of a new Continuing Committee will take place on the last day of the Conference.

Topics for Working Groups

1. Arms Control.
(a) role of nuclear umbrella or minimun deterrent;
(b) role, levels and traffic in conventional arms;
(c) liquidation of foreign military bases;
(d) nuclear-free zones;
(e) halting the arms race and preventing proliferation of nuclear weapons (comprehensive test ban, A. B. M.'s, nuclear guarantees).

2. Peacekeeping and Security.
(a) role of the U. N. and other international bodies;
(b) basis of conflicts and their resolutions;
(c) non-use of force in settling international disputes;
(d) enforcement of international treaties;
(e) European security and the problem of Germany.

3. New Approaches in Disarmament.
(a) methods of eliminating the development and use of biological and chemical weapons;
(b) problems of oceans and space;
(c) control of peaceful uses of atomic energy;
(d) dealing with future discoveries and development of weapons of mass destruction;
(e) new ideas about comprehensive disarmament.

4. International Programmes in Science.
(a) co-operation in space and satellite research;
(b) International Biological Programme;
(c) International Science Foundation;
(d) problems of free circulation of scientists;
(e) scientific information storage and retrieval.

5. Technology and Development.
(a) resource development and utilization;
(b) role and planning of universities in developing countries;
(c) training and utilization of indigenous talent;
(d) the "brain-drain" problem;
(e) acceptance of technological innovation and change in the developing world;
(f) organization of technical assistance programmes.

6. The Special Responsibilities of Scientists.
(a) role of scientists in advising governmentsand international organizations;
(b) role of scientists in influencing public opinion;
(c) the ethical problems created by applications of modern science;
(d) scientists' responsibility in public education on meaning and implications of science.

DEATH OF PROFESSOR H. J. MULLER

Professor Hermann Joseph Muller died on April 5th, 1967, at the age of seventy-six. Apart from his scientific achievements, mainly in the field of radiation genetics for which he received the Nobel Prize in 1946, Professor Muller was deeply concerned with the social implications of scientific advance. He was one of the signatories of the Russell-Einstein Manifesto, which gave rise to the Pugwash Movement. He participated in the First and Third Pugwash Conferences. Ill-health compelled him to decline the invitation to the 17th Pugwash Conference in Ronneby. In a letter to the Secretary-General about this Conference he said:

"Let me send you my warm well-wishing for the 17th Pugwash Conference, and my deep regret that I will not be able to participate. I am convinced that Pugwash has always been a most remarkable and effective effort in behalf of a salutary peace and of a constructive world in general, even though from a close-up view it has so often seemed to have failed to reach the public or its leaders. At any rate, my cordial greetings for a most successful Conference in Sweden on the very critical topic there to be considered: 'Scientists and World Affairs'.".

FIRST SOUTH-EAST ASIAN REGIONAL PUGWASH CONFERENCE

Melbourne, January 23-27, 1967

As reported in the previous issue, the first South-East Asian Regional Pugwash Conference was held in Melbourne, January 23-27, 1967. As an experiment in a new type of Pugwash activity, to enable more scientists to take part in international discussion without the great expense usually involved in bringing participants from remote parts of the world, it was highly successful. The majority of the participants were newcomers to Pugwash, but they soon grasped our method of work, and the tone and atmosphere of the discussions were very much like the usual Pugwash Conferences. Perhaps too much time was spent on summarizing the papers submitted and not enough left for the study groups, which were set up only towards the end of the Conference. Nevertheless, the discussions were of a high standard and yielded useful results.

The main weakness of the Conference was the absence of scientists from many countries of the region, particularly China and Vietnam, despite the efforts made by the organizers, the Australian Pugwash Group. On the other hand, many scientists from Australia wished to attend and, in order to avoid overloading the meeting with Australians, the organizers designated some of them as alternates, to attend some of the meetings, so that at no time were there more Australian participants than the total number from the other countries.

The statement from the Conference with a list of participants are given below; abstracts of the papers submitted to the Conference are also printed in this issue.

Statement from the Melbourne Conference

The first South-East Asian Regional Pugwash Conference was held at International House, University of Melbourne, from 23rd to 27th January, 1967. It was attended by participants from Australia, Ceylon, India, Indonesia, Japan, Malaysia, New Zealand, Pakistan, Singapore and observers from the Continuing Committee, the United Nations and the Australian Department of External Affairs.

The Conference concerned itself with the following major areas:

1. Definition of crucial areas in which the application of science and technology will most rapidly improve living standards; pre-requisites for success in these areas.

2. Problems of security and their effect on the development of science and technology.

3. Education and training; role of tertiary institutes; the question of developing a technician force.

The discussions were held in a frank and cordial atmosphere and were most fruitful. This Conference has shown the need for this type of discussion among scientists in the South-East Asian region and it was decided that further regional conferences should be held at regular intervals.

The following is a brief summary of the discussions arranged under the headings of:

1. Regional co-operation in development and education.

2. Food science and technology in developing countries.

3. Problems of security and development.

These categories correspond to the subjects studied by specific working groups in the latter stages of the Conference.

1. Regional Co-operation in Development and Education

The Conference considered that the term "aid" may inhibit responsible requests, and thought it necessary to stress the mutual advantages to be gained by both developed and less developed countries from a co-operative programme of regional development.

To facilitate such co-operation some mechanism for selection and integration of projects were discussed.

1.1. Mechanism for administering co-operative programmes

a) For large programmes administration should be through existing international organizations, including international finance institutions. To expedite effective administration more support should be given, both financially and in terms of expert scientific and technical manpower, to the United Nations Economic and Social Council's Advisory Committee on the Application of Science and Technology to Development.

b) For smaller projects bilateral co-operation between governments may be more appropriate.

c) In order to build up the scientific and technical personnel needed to enable programmes under (a) and (b) to be used more efficiently, an immediate effort should be made to increase contacts and exchanges between scientists and institutions in the region.

1.2. Co-operative programme selection

For the better integration of the development programme on a country and regional basis, the recommendation of the United Nations Committee and the Economic Council for Asia and the Far East, that proposals should be channelled through science research councils or similar bodies where they exist, is supported. Where these do not exist advisory scientific committees should be set up in both recipient and donor countries to include, amongst others, scientists involved in government departments, industrial research groups and the universities. Such advisory groups could:

a) assess the feasibility and priorities of development projects in the light of the country's resources and needs;

b) advise on the suitability of candidates for service in particular projects overseas;

c) be used as a communication body to make maximum use of scientists and technicians from overseas visiting the country.

Many of these activities are at present carried out by existing bodies in some countries, but it was felt that the reliance of programme administrators on the advice of such an integrating group would help it to develop and extend its use where these do not yet exist.

1. 3. Choice of programmes

The principles governing the choice of programmes should include the following;

a) Priority should be given to short term projects, which are attractive in achieving a rapid result at a finite cost, only where they are able to initiate a continuing process of development.

b) Preference should be given to projects which can add to the experience of the region as a whole, where continuous exchange of experience between countries in the region can lead to easy adjustment of the programmes.

c) In considering suitable projects all phases of the programme must be considered - its integration into the existing local situation, the ancillary services needed by way of initial equipment and personnel, and the introduction of the project into the social system.

1. 4. Supply of scientific and technical personnel

a) In order to avoid waste of time by visiting scientists, the host country should make sure that, if possible, it can provide suitable accommodation and facilities. Careful selection of the visiting scientist and his adequate briefing on the country's particular problems is necessary, and could be undertaken by the science research councils or equivalent bodies.

b) There is a need to encourage scientists to work overseas. Academic and government bodies are asked to facilitate the free movement of scientists and to encourage service overseas as part of a normal career and without prejudice to their professional advancement.

(i) A specific proposal is made that the Australian Pugwash Group should request the Vice-Chancellors' Committee to initiate discussions with C. S. I. R. O. and the Department of External Affairs on the sending of staff to developing countries for two years, one year to be paid for by the employer, and one year by the Department of External Affairs.

(ii) It is recommended to the Australian Government that provision be made under the Colombo Plan and other schemes for scientists and technologists, especially those of a more senior

level, to study in Australia without the undue financial sacrifice which, in many cases, they have at present to make.

1.5. Education

The Conference considered some general features of education in the region and emphasized the importance of stressing world-wide human values in education. Past practices have sometimes made it difficult for children to cultivate attitudes appropriate to a shrinking and uniting world.

Technical training. The Conference noted the recommendations for general education and training made by the United Nations Advisory Committee on the Application of Science and Technology to Development. While agreeing with these recommendations, the Conference noted that the training of technicians is not discussed. The rapid creation of a technician cadre, intermediate in skill and function between the tradesman and the professional or technologist, is essential to a country's development and at least four such people are needed for each professionally trained one. In the absence of a developed local industry, adequate technical training cannot be provided and a start must be made by obtaining the necessary skills abroad.

It became apparent that there are many ad hoc methods for obtaining this initial stimulus. These can be regarded as training schemes; they must not be regarded as an alternative to this.

2. Food Science and Technology in Developing Countries

The wastage and spoilage of food is as important a problem in feeding the world as is the failure to produce high yields per acre. In this context a number of important questions were considered, including:

- the high proportion of the population engaged in food production;
- lack of literacy amongst food producers;
- the prevalence of subsistence farming;
- ignorance of the relation between health and nutrition;
- inadequate advisory services in agriculture and fisheries;
- ineffectual health inspection services;
- lack of attraction for careers in extension services;
- preference of university and college graduates for urban employment;
- emphasis of developmental projects on industrialization;
- low standards of sanitation and hygiene;
- dietary proscriptions and taboos;
- man's mistrust of technological change.

The solution is seen in the establishment of a safe chain in food management from producer to consumer, one which is firmly rooted in the social habits and the cultural pattern of the population. Based on the experience in technologically advanced countries, a solution must be found to incorporate this in the ways of life of developing ones.

We need to measure the magnitude of the problem in each of these developing countries, and then to deal with it by incorporating the necessary knowledge into the educational system at every level from primary education to teacher training. The education of girls and women here is especially important.

3. Problems of Security and Development

The Conference discussed a number of aspects relating to the effect of security arrangements on development. These included the effect of setting up military-science complexes; the "uncertainty" which enters into the making of decisions by individual nations under conditions of military security, and the related questions of the spread of nuclear weapons in South-East Asian countries; the need for establishing institutes for peace research as distinct from those for the study of war; and the refugee problem in South Vietnam.

In the short time available it was not possible to discuss these problems in depth, although it was recognized that they were of vital importance. For this reason the Conference suggests that this topic be discussed further at the next Regional Conference.

3.1. Interaction between Science, National Security and Development within individual countries in South-East Asia

The Conference recommends that the following steps be taken to prepare for the discussion of this item at the next Conference:

A person or persons should be asked to formulate specific queries which might most usefully elicit information of the kind required.

Scientists in each of the participating countries should be asked to provide the information referred to in these queries.

This information should then be collated in the form of a working paper for discussion at the Conference.

The Conference suggests that questions of the following kind should be considered in formulation of the queries referred to above:

(a) What proportion of the national scientific effort in terms of money and manpower, is being specifically directed towards increasing the military potential of the country?

(b) What arguments are used by the government to support this outlay of resources?

(c) Is the true extent of the financial and manpower commitment in this direction ascertainable?

(d) To what extent is scientific research in university or civil research centres financially supported by funds from the defence budget?

(e) To what extent is scientific research in laboratories of all kinds financed by grants from overseas funds?

(f) Can any reliable estimate be made of the potential of the country for the production of nuclear

weapons, preparations for biological and chemical warfare and delivery systems?

(g) Has there been any recent build-up of conventional armaments in the country?

3.2. Regional Co-operation in Peace Research

The Conferences endorses the earlier approach to the problem of Regional Co-operation in Research as outlined in Section 4 of the report of Working Group 2 of the Fifteenth Pugwash Conference. In addition to this, and guided by the same principles, the Conference believes that the establishment of an International Institute directed towards peace research, with particular interest in South-East Asia, would be one of the most valuable contributions which could be made to the security and development of the area. In the meantime, the fullest support should be given to research groups within individual countries, which seek answers to such questions as:

(a) What conditions cause nations to initiate wars?

(b) What factors lead a country to believe that its national security is threatened?

(c) Can a stable state of overall security in the area be achieved by the principle of mutual deterrence based on non-nuclear weapons?

3.3. Vietnam

The Conference views with the gravest disquiet the continuing escalation of the war in Vietnam, which may lead to a third world war and has already brought the world into a new phase of the arms race.

The Conference regrets the violent death of so many people, both combatant and non-combatant, due mostly to the indiscriminate nature of warfare. Scientists of the whole world must be concerned about the increasing use of science for the destruction of human lives and vital resources.

Of special and immediate concern is the plight of refugees and the devastation of once-fertile areas. Every effort should be made to extend aid for the rehabilitation and care of the civilian population.

The Conference affirms that the only satisfactory way out of this disastrous situation is a negotiated settlement. There was substantial agreement that conditions must be created in which the Vietnamese people north and south of the provisional demarcation line settle their own affairs without outside interference as stipulated, for example, in the 1954-1962 Geneva Agreements.

The Conference agreed that the countries in this region have a particular contribution to make to this settlement and recommends an appeal to all scientists to make every effort towards this solution of the Vietnam conflict.

The disastrous situation in Vietnam is a reminder that scientists must make greater efforts to bring about conditions in which scientific and technological developments lead to world peace rather than world war.

LIST OF MEMBERS

OF THE MELBOURNE CONFERENCE

Dr. W. Boas (Australia)
Prof. T. O. Browning (Australia)
Sir Macfarlane Burnet (Australia)
Prof. A. L. Burns (Australia)
Dr. J. C. V. Chinnappa (Ceylon)
Mr. D. Curzon (Australia)
Dr. S. Dhawan (India)
Dr. J. M. Dickins (Australia)
Prof. J. F. Duncan (New Zealand)
Prof. C. J. Eliezer (Malaysia)
Dr. P. J. Fensham (Australia)
Dr. K. Fowler (Australia)
Sir Otto Frankel (Australia)
Prof. M. F. Glaessner (Australia)
Mr. C. S. Gloe (Australia)
Dr. H. G. Higgins (Australia)
Dr. Helen Hughes (Australia)
Dr. E. K. Inall (Australia)
Miss Maris King (Australia)
Mr. I. Langlands (Australia)
Mr. J. W. Legge (Australia)
Dr. M. R. Lemberg (Australia)
Mr. H. H. Lim (Singapore)
Dr. Patricia J. Lindop (Pugwash Continuing Committee)
Dr. J. A. McDonell (Australia)
Dr. D. F. Martyn (Australia)
Mrs. Blanche Merz (Australia)
Prof. B. Y. Mills (Australia)
Prof. Y. Miyake (Japan)
Sir Mark Oliphant (Australia)
Mr. M. A. Rana (Pakistan)
Dr. F. H. Reuter (Australia)
Prof. J. Rotblat (Pugwash Continuing Committee)
Dr. A. A. Sandosham (Malaysia)
Mr. E. J. Seow (Singapore)
Prof. B. Soemantri (Indonesia)
Mr. M. Teichmann (Australia)
Mr. A. C. Tyrrell (United Nations)
Sir Frederick White (Australia)
Prof. E. Yamada (Japan)

ABSTRACTS OF PAPERS

PRESENTED AT THE MELBOURNE CONFERENCE

A. L. Burns

PROLIFERATION OF NUCLEAR WEAPONS IN ASIA

In the mid-1950's, when the Soviet Union had developed intermediate range missiles, these were targeted on the countries of Western Europe so making them hostages for their good behaviour, in particular the nuclear behaviour of the United States. After China exploded a nuclear bomb a statement was issued from Peking emphasizing that the Chinese nuclear weapon was not for aggressive purposes, that it was meant for the defence of the peace-loving people of the world, but it was carefully pointed out that Japan in particular was running a great risk by having in and around its waters

American military forces. Quite specifically then Peking spelt out this hostage-taking strategy.

The Chinese nuclear threat to India is of a different kind, because India is less tied up with the Western Bloc System than is Japan or Australia; it is a politically important threat. Indian leaders feel that it is important for internal political cohesion that the Indian people should not fear that their government is unable to provide security for them against a possible Chinese threat. It may be decided on political grounds that India will need to build an atomic bomb in order to ensure this confidence in the government.

It would be unwise to discount the possibility, that - whatever agreements about non-proliferation are arrived at between the United States and the Soviet Union - Japan, India, and possibly other countries in Asia will, within the next fifteen years, feel compelled to acquire nuclear weapons and the means of delivering them, for the same kind of reason which impelled France to acquire nuclear weapons. In these circumstances it is difficult to see how we can prevent the spread of a science-military complex in countries in Asia which are subjected to this strategy. The biggest military-industrial complex in Asia - if we set aside the Asian part of the Soviet Union - is that of China. Potentially by far the most important military-industrial complex that could arise in Asia would be in Japan; it seems very likely that in the next twenty years, if there is no major nuclear war, Japan will be the third world industrial power.

D. Curzon

SCIENTIFIC AID TO DEVELOPING COUNTRIES

The classification of research into "basic" and "applied" is highly misleading if one is considering the application of science to the problems of economic development. The papers submitted to the United Nations Conference on Science and Technology for Development indicate that much "applied" research can be expected to be useless, while certain "basic" research can be crucial in solving the practical problems of economic development in a particular country.

It is more relevant to distinguish research induced by problems that have arisen in the course of economic or administrative activity, from research initiated by scientists alone, in the anticipation that its results may prove useful. Such anticipatory research involves implicit assessments of current and future economic and social requirements. Scientists may in fact have little knowledge of such considerations.

It has been suggested that scientific research for development be considered a success only if its results are subsequently implemented and prove useful. The strong implication of this attitude, together with the above considerations, is that those research

institutes whose objectives are to help in tackling problems of economic development should not have autonomy to decide the goals of their own research programme.

There is a need for a formal means of liaison between scientific institutes and the economic institutions of a developing country - such as the Planning Authority and major public and private corporations.

One of the functions of such a liaison group could be to formulate specific requests for scientific aid. Four possible types of such assistance are:

a) A working group of experts sent to tackle some clearly defined project, e. g. a soil, forest or other survey.

b) The use of the donor country's technical facilities and skilled manpower in undertaking research or development projects for the recipient country.

c) Various training programmes in the donor country.

d) Supplementary staffing for the scientific institutes and universities in the recipient country both at the highest levels - research project director, professor - and at the "skilled technician" level.

C. J. Eliezer

COMMENTS ON EDUCATION AND SCIENTIFIC TRAINING IN SOUTH EAST ASIA

Development of human resources is a very important priority for countries of South East Asia. Education has expanded on a rapid scale since Independence. Closer links between university and industry are of great importance, in particular, the need to expand local research in big industrial concerns some of which have in the past depended solely on their links with headquarters overseas.

Scientists of all countries should be interested and involved in education at every level and, particularly to ensure that the sense of values communicated through teaching of social history includes world-wide values rather than tribal or national values. There is the danger of causing violence to the personality of children, in the name of patriotism, where limited versions of history create in them prejudices and attitudes which make it difficult for them to face up to or live happily in a uniting world.

The need for countries in the region to participate and co-operate in improving methods of science teaching is emphasized. In particular, the possibility of a South East Asian Institute of Mathematics is urged.

W. G. Faithfull (Australia)

TERTIARY EDUCATION AND NATIONAL DEVELOPMENT IN THE PHILIPPINES

Countries usually described as "underdeveloped", "developing", or "poorer", face similar fundamental problems. Subsistence economies, export of natural resources and primary products, rapid population growth and the struggle to establish and expand industry, are common to all. Usually, the attack on these problems has led to the establishment of economic planning systems, sometimes more advanced and more effective than in the affluent countries of the world.

Economic planning or development planning concerned with resources and their conservation and use, has sometimes tended to consider natural resources alone. However, poverty of natural resources is not now, and probably never will be, a limiting factor in development of any large country or region. The real limiting factor is the underdevelopment of the existing, flexible, adaptable, intelligent resources of manpower.

Progress will be limited as long as there is a preponderance of illiteracy, as long as the stream of educated and trained young people remains weak, and as long as there is not a strong core of leadership. Education is the key, and tertiary schooling and technical training are most important parts of the key. All too often the emphasis in education in poorer countries has been on the humanities, especially arts, law and medicine. Law provides most of the politicians, who might be considered as least productive in an economic sense. The practice of medicine has reacted against development in some respects, in reducing infant mortality and increasing life expectancy, thus producing the enormous growth of the last two decades. There are many other professions and trades of equal or perhaps greater importance which have been neglected in the desire for prestige education and quicker access to affluence.

The so-called brain drain is an outcome, but its importance is probably exaggerated. Certainly, thousands of doctors, nurses and lawyers and others have migrated from the poorer countries, but many of them support and educate relatives at home or return home in due course with their accumulated riches.

These questions are too little debated and they are vital to any development plan. Manpower planning is, therefore, assuming greater importance and the relationships of population, education, training, and political administrative and economic advancement are beginning to receive more attention. In the Philippines increasing awareness of the interdependence of these factors, stimulated to some extent by discussions and action in urban and regional planning, is leading to the establishment of a Public Affairs Complex in the National

University. The complex will be concerned with the formulation, adoption and implementation of government programmes. It will relate a number of disciplines and activities with the object of ensuring maximum contributions towards the advancement of the country.

O. Frankel

TECHNICAL ASSISTANCE PROGRAMMES: PURPOSES AND ACHIEVEMENTS

During the last 20 years international action and discussion on aid to developing countries has gone on. Although at this stage it is not easy to assess its full effects, it is clear that some projects have been successful and others not. In general, it would be important to try and assess the reasons for this when making plans for the future.

The projects to date were often "bitty" or disjointed throughout different countries and within countries. They were in fact project-based, i. e. based on an individual conception with usually a specified time to achieve their end. This prevented long-term development and planning in countries with scarce resources and little manpower facilities. By contrast, long-term projects planned by the Rockefeller Foundation had proved much more successful. In the case of the project-based aid programmes it had often proved necessary to repeat the operation several times and the benefits gained from the repeated expenditure was not as great as if the full amount had been spent on one well-planned programme from the beginning.

There also appeared to be some fault in the education associated with the programme, necessitating their repetition in neighbouring areas. This often arose because the local staff associated with implementation of the programme were appointed too late in the planning and only received partial information about the overall scheme, just enough to start it but not enough to keep it going if any difficulties arose. This is probably because we are concerned too much with quick results in one sphere and confine ourselves to too simple a level, e. g. training only farmers with agricultural extension information instead of agricultural research workers as well. Today's emphasis on technology has pushed pure science in the developing countries into the background. This will hinder the proper development of science and the economy of the nation because of lack of fundamental scientific research. The development of universities is one of the slowest parts of a developing nation and should receive immediate assistance. With the setting up of the Advisory Committee on the Application of Science and Technology to Development we may expect more integration in the approach to these problems.

C. S. Gloe

AN EXAMPLE OF TECHNICAL AID TO AN ASIAN COUNTRY BY THE COMMONWEALTH OF AUSTRALIA THROUGH THE COLOMBO PLAN

The sharp increase in demand for electrical power in Thailand commenced about 1950, and thermal stations burning lignite have played a significant part in this development. The original Mae Moh project was to provide power to several cities in North Thailand, and later to the Yanhee hydro-electric project during construction. After Yanhee came into operation, it was decided to use the power generated at Mae Moh for a fertilizer plant which also would use lignite as raw material for the manufacture of urea and ammonium sulphate. The construction of an additional, and larger thermal power station at Mae Moh, is under construction.

The Kiabi Project was designed to provide an integrated electrical power supply to a number of cities in South Thailand as well as to many tin mines in this area. Lignite is the cheapest fuel available and is supplied to a power station which has two 20 MW units in operation and a third under construction.

The Commonwealth of Australia has provided aid to these projects over a period of some 12 years under the Colombo Plan, and in a variety of other ways including material gifts. Technical experts have been made available from Australia on a number of occasions and some 12 Thai personnel from the projects have received technical and administrative training in Australia.

There is little doubt that the Australian participation in these projects has been valuable not only in their establishment but also for their present expansion. The training of personnel has, in most regards, proved successful. Other significant benefits, such as goodwill and personal friendships between the peoples of both countries, have followed automatically.

Helen Hughes

AUSTRALIAN AID TO DEVELOPING COUNTRIES

In 1965-66 Australia's contribution to the aid of developing countries was $A110 million. This represents 0.65% of national income making Australia one of the few developed countries which gave more than 0.5% of their national income in aid. However, some $A73 million, 70% of the total amount, went toward fulfilling our responsibilities in Papua-New Guinea, and another $A2.2 million (2%) was in the form of "economic assistance of a defence support nature" to the members of the South East Asia Treaty Organization. Voluntary aid organizations were responsible for less than 3% of the total assistance effort, but the quality of their work and their

impact on public opinion are more important than the figure suggests. They are contributing to the establishment of a climate of public opinion in which an increase of the Australian contribution to aid to at least 1% of the national income, the generally accepted minimum target for wealthy nations, would be feasible.

Australia's most valuable form of assistance is probably the education of students from developing countries. There are some 13,000 of these in Australian schools, tertiary colleges and Universities, but a substantial expansion in their number is at present unlikely because of the lack of resources of the Australian educational system. Australia spends a smaller proportion of its national income on education than any "Western" country except Greece, Portugal and Spain. The availability of places in the education system depends on how Australia can resolve its problem of financing its schools and Universities adequately.

A number of Australian scientists and technologists are working in developing countries, and the Australian Volunteers Abroad programme is recruiting technicians and tradesmen, as well as professional people, in an attempt to help to fill one of the greatest gaps in trained manpower in developing countries.

There is no doubt that this type of activity should be extended, particularly in the direction of exchanges between parallel scientific, teaching and other institutions, but again the shortage of skilled manpower in Australia is at least as great a barrier as the lack of funds for aid. and it can only be solved when Australia begins to tackle its own problems of education and training for skill, technology and science.

I. Langlands

PROPOSED "E. C. A. F. E. ADVISORY COUNCIL FOR INDUSTRIAL RESEARCH"

Early in December, 1966, the Economic Council for Asia and the Far East (E. C. A. F. E.) arranged a meeting in Bangkok of an ad hoc "Consultative Group for Promoting Co-ordinated Industrial Research in Asia and the Far East". This was attended by senior officers of Government organizations engaged in industrial research. The participants acted in their personal capacities and not as the representatives of their Governments or of their organizations. The countries represented were: Australia, India, Iran, Japan, South Korea, Pakistan, Philippines, Singapore, Taiwan and Thailand.

In its report to E. C. A. F. E., the Group emphasized the important role of local research and development, not only in making the most effective use of imported technology but also in assisting self-sustained economic growth by developing original technology best suited to the economic and industrial needs of the country.

The Group agreed that the co-ordination of programmes among

countries and institutes, and co-operation in the execution of research programmes, would be invaluable in making best use of the limited resources available, and that much can be done by way of exchange of specialized knowledge, research personnel, joint training programmes, sharing of equipment etc. However, because of major difficulties, proposals for setting up regional or sub-regional institutes for industrial research in the immediate future, however desirable, are premature and the community of interest, the essential prerequisite for successful collaborative industrial research, must first be established.

After full consideration the Group agreed with the Asian Conference on Industrialization, held in Manila in December 1965, that there is a need for a regional body to encourage co-operation in industrial research and development, as distinct from scientific research. It recommended, therefore, that a "E. C. A. F. E. Advisory Council for Industrial Research" be established, inter alia to review programmes and plans for industrial research in the countries of the region, to advise E. C. A. F. E. on the adequacy of industrial research in the region, to identify industrial research projects suitable for joint action, and to advise how such projects should be implemented, to advise on the training and most efficient use of industrial research workers and to act as a clearing house for information on industrial research.

The Council would consist of one representative from each of the member and associate member countries of the E. C. A. F. E. region, chosen for their knowledge of industrial research and serving in their personal capacities. The Council would meet at least once a year and would be served by a new "Industrial Research Section" of E. C. A. F. E. For the first two years, at least, all costs would be met by E. C. A. F. E.

R. Lemberg

THE REFUGEE PROBLEM IN SOUTH-VIETNAM

The plight of more than 600,000 refugees which the Vietnam war has created, in addition to the one million refugees which entered the country in 1954 from the North, is described in reports of a mission of workers of the American Friends Service Committee, which has now established a Day Centre for refugee children 300 miles N. E. of Saigon. Although not much can be done for the refugees in the present war situation, there is the possibility of a complete breakdown of hope and the development of an ineradicable hopelessness and apathy, not only among the refugees themselves but of the whole of the people of South Vietnam, unless something is done now to help them. This apathy would also gravely endanger any hope of reconstruction after cessation of hostilities which is essential for the well-being of the South East Asian region and for India.

The Mekong river delta is a "rice-bowl" of great potential, while at present South Vietnam must import rice. The reports also contain a far from reassuring judgement on the negative and positive factors for a reconstruction of South Vietnam. The negative factors include the lack of planning of the military government for peace, in-built corruption of the civil service, an antiquated colonial education system and, above all, exhausted and largely disaffected people. The positive factors are the great agricultural and economic potential, a new sense of responsibility among young intellectuals, a re-awakened Buddhism with deep roots in the hamlets, and a new spirit in the young Vietnam Confederation of Labour. "We are afraid that the odds are against success, and that the negative factors will prove too much of a handicap to be overcome". The ultimate hope must rest with firm international control of peace, if large-scale murder and destruction is to be avoided. Only then can scientists hope to play a role, together with the U. N., in the reconstruction of Vietnam.

Y. Miyake

THE IMPORTANCE OF PREVENTING THE FORMATION OF MILITARY-SCIENCE COMPLEXES IN ASIA

A military-science complex is defined as any form of co-operation between military establishments and science or technology. It is important to prevent the formation of new military-science complexes in Asia, either for nuclear weapons or for any other military purpose. Otherwise, we cannot expect a proper development of science and technology for peace and for the benefit of the people, either in Asia or the rest of the world. If strong military-science complexes are established in Asia, they will destroy the social economy, and the Asian people will have to endure an even lower standard of living than at present; this in turn will increase international tensions due to the increase in inequality between the developing and the developed countries. The worst situation would be the formation of military-science complexes with the aid of other countries.

Military-science complexes waste the creative ability of scientists and bring about moral degeneration among them, which will lead to disintegration of the traditional morality in the Asian societies and hinder the awakening of people who might contribute to world peace.

J. Read (New Zealand)

PROTEIN FROM PETROLEUM

Research, carried out mainly in France, is concerned with the large scale growth of certain yeasts which use petroleum as their source of

hydrocarbon, and the extraction of protein from yeast. This protein is equal in nutritive value to animal protein and is, therefore, superior to most vegetable proteins. It is generally conceded that where food is scarce there is enough roughage and carbohydrate; it is good protein which is missing. By using less than 4% of the world's oil production for this purpose, the world's animal protein supply could be doubled. This would be sufficient to bring the consumption of protein in the less developed parts of the world approximately up to the present level in the most developed parts.

The method consists of maintaining a colloidal suspension of oil droplets in water by air bubbling. The water also contains the necessary inorganic elements and vitamins and is seeded with the right type of yeast. It has the very great advantage that it can be made almost entirely automatic - a matter of pumps, pipes, tanks and valves, and needs only a skeleton staff of skilled men. It is not necessary to try to educate millions of illiterate peasant farmers in better agricultural methods. It seems that, in principle, the problem of the world food shortage is already solved. What is required is the vigorous exploitation of this method. Several East Asian countries possess rich oil fields.

Having regard to the extreme seriousness of the imminent world food shortage ought not this problem be tackled on a world wide scale, with the co-operation of all who can help, and a free exchange of all information? Is it right that such a promising solution, as the production of protein from yeast grown in oil, should be kept as a commerical venture of a few firms, working with a certain degree of secrecy? Ought it not to be taken up by academic and government organizations?

F. H. Reuter

THE SIGNIFICANCE OF THE APPLICATION OF FOOD SCIENCE AND TECHNOLOGY TO DEVELOPING COUNTRIES

The world's growing population can only be fed by the use of more land for food production; improved productivity of agricultural and pastural lands; and larger catches of marine foods and fish from inland waters. These are problems traditionally the concern of agricultural and fisheries sciences. Their solution also demands the harnessing of the resources of food science and technology by the minimization of losses from the time foods are produced until they are consumed; development of new foods from conventional raw materials and plants not yet used as human food; and, development of new techniques of food preservation and the adaptation of conventional ones to the conditions of developing countries.

All foods are perishable, because they are of biological origin. The control of the rates at which intrinsic and extrinsic factors reduce the world's food supplies can contribute much to economic and social progress.

It is characteristic for technically advanced countries that food losses from the time of production to consumption are much lower than they are in developing countries. It is also characteristic for them that their foods are produced where it is most economical to do so, and for consumption when and where needed, a situation brought about by the application of food science and technology.

Great progress has been made in this respect, but the position is still far from satisfactory. Recent American estimates place losses in storage, marketing and processing after the crops and livestock have been produced at $1,500 million per year. These losses are additional to those suffered during production, estimated at $13,800 million per year.

The situation is much worse in developing countries. According to a recent Indian estimate, over half of the food raised in the country is not available for human consumption due to insect and rodent damage alone. Further substantial losses occur as the result of defective handling practices in storage, transport and marketing.

The technical and scientific information is available how to remedy the situation, but at the present time, only the developed countries take advantage of it.

This is due to a broad spectrum of resistances in developing countries.

The solution is seen in the establishment of a safe chain in food management from producer to consumer, one which is firmly rooted in the social habits and the cultural pattern of the population. Based on the experience in technologically advanced countries, a solution must be found to incorporate this in the ways of life of developing ones. Efforts must be made to promote the organic growth of sound food handling practices appropriate to climatic conditions and the indigenous cultural pattern.

These are concepts of fundamental importance, currently receiving little attention, though F. A. O. more recently has started to include them in its programme.

A. A. Sandosham

SCIENCE AND TECHNOLOGY IN MALAYA TODAY

The paper starts with some background information about Malaya, and the causes for delay in implementing the industrialization policy.

Malaya has no tradition of science and the schools are not geared to produce potential scientists. Problems have arisen out of having schools of different language media, emphasis on the national language and a policy of universal education with resulting expansion and lowering of standards. There are few Colleges and only one University in the country.

A brief outline is given of Scientific Institutes and Research Organizations in Malaya and the nature of their work. The Government Instit-

utes provide Government with scientific, investigatory and advisory services and carry out researches of an applied nature. The important places where scientific research is being carried out in Malaya are the University, Fisheries Research Institute, Tropical Fish Culture Research Institute, Forest Research Institute, Pineapple Research Institute, Institute for Medical Research, Veterinary Research Institute and Rubber Research Institute. General health has improved and biological production has been raised largely by better breeding and selection of plant crops and animal husbandry.

Industrialization has commenced and the Government provides advisory services and encouragement by giving pioneer status. About 11,000 factories, mostly small ones, have come into existence and produce about 40% of manufactured consumer goods.

Recommendations include the setting up of a National Institute for Scientific and Industrial Research to provide an integrated approach to science planning for the country as a whole; the giving of a broader and more general education in science to the public and administrators; the reorientation of science teaching in schools; and propaganda to knock out the lethargic and apathetic attitude towards a betterment of the lives of the people, especially those in the rural areas. There is also the need for greater interchange of information and scientific knowledge, especially with other countries in the region, where the problems are likely to be somewhat similar.

B. Soemantri

SCIENCE AND TECHNOLOGY IN INDONESIA

When Indonesia became independent it was very underdeveloped in science and technology. After independence a great expansion took place at the primary, secondary and tertiary levels of education; this was greatly helped by the introduction of the Indonesian language. At the present time, nearly 90% of school-age children are attending elementary school, and about 200,000 students attend universities and other institutions of higher education.

Due to the great shortage of personnel, the emphasis has been on quantity rather than on quality. However, the standards of training of personnel are now improving, particularly thanks to affiliations of Indonesian institutions with many foreign universities.

A number of research institutions have been established by the Department for National Research. These are concerned with policy-oriented research or short-term development research, leaving fundamental research to the universities.

There is a severe shortage of technicians. The vocational schools are working on limited budgets, and since the social standing of technicians is low, they do not attract students.

A number of specific examples are given of areas in which the application of science and technology could rapidly improve standards of living. These include agriculture, conservation of food, and natural and mineral resources.

Finally, brief mention is made of the problems of security and their effect on the development of science and technology.

M. Teichmann

PEACE RESEARCH OR STRATEGIC STUDIES?

Research into the causes of war and the conditions of peace is urgently needed. At present the funds available for war research are disproportionate to those for peace research. The reasons for this include: the acceptance of war as natural or inevitable and our unconscious addiction to violence, a world without war being unthinkable because psychologically unacceptable. The state is usually unwilling to subsidize research into the abolition of war, which would entail the abolition of armies, military history, heroes and so on. A new branch of war research, i.e. strategic studies, has arisen. This discipline accepts war as a given entity, despite its ritual excursions into moralizing. It is far easier to get money and intellectual respectability for the analysis of strategic problems and the formulation of recommendations for military action than for the study of peace.

Certain dangers attend institutes which divide their interests between peace and war.

The prospects for peace research in Australia are examined.

F. W. G. White

SCIENTIFIC TECHNICAL AND INDUSTRIAL DEVELOPMENT IN SOUTH-EAST ASIA - C. S. I. R. O. PARTICIPATION

The paper starts with a review of the organization and activities of the Commonwealth Scientific and Industrial Research Organization. The collaboration of C. S. I. R. O. with countries in South-East Asia comes under the following headings: (1) the scientific administration and organization and development of scientific and technical institutes and services; (2) scientific and technical advice by correspondence or through the provision of consultants or experts for specific projects, or through the provision of exchange of materials; (3) the training of personnel; (4) indirect assistance. Among the examples of such collaboration there is the loan of Australian scientists to India and Thailand to help in specific problems of scientific administration and organization, as well as numerous scientific and technical advice offered by C. S. I. R. O. to a number of countries in the region.

Australian scientists, particularly in C. S. I. R. O., have made a strenuous effort to establish close contacts with their colleagues in South-East Asia. They have come to know many institutions and individuals in this area intimately, and in a mutually stimulating way. This effort is of benefit to Australia as well as to other countries.

United Nations. Office of the Director for Science and Technology

THE CONTRIBUTION OF THE UNITED NATIONS THROUGH ITS ADVISORY COMMITTEE ON THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT

The United Nations has drawn attention to the importance of the application of science in a number of conferences since 1961.

In 1963 the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas was convened. It touched on all the scientific disciplines and on many aspects of modern society. It considered how systematic planning could facilitate adoption of these techniques.

To develop the ideas emerging from this Conference, the Advisory Committee on the Application of Science and Technology to Development was established. Its 18 members, representing both advanced and less-advanced countries, include specialists in agriculture, atomic energy, biology, medicine, physics, education, administration and scientific research. Its purpose is to examine the possibility of establishing a programme of international co-operation in science and technology for economic and social development, and to propose specific projects to such a programme.

In its report, the Advisory Committee has suggested a number of steps: (1) the establishment in the developing countries of a long-term scientific and technological policy geared to the Government's plan of social and economic development; (2) the establishment of a national co-ordinating agency; (3) the preparation of special publications in developed and developing countries for information on science and technology; (4) the strengthening of affiliations between universities and research institutes in developed and developing countries.

The Committee has selected problem areas which it believes to be of special significance: food, health, population, natural resources, industrialization, housing and urban planning, transportation and education.

The third, and most recent, report of the Advisory Committee sets forth a proposal for a World Plan of Action. This deals with the infrastructure needed and includes recommendations on a series of objectives for scientific education in developing countries. It suggests a five-year plan for the development of basic structures in science and technology, discusses the need for new methods of handling and processing information and outlines the responsibilities of Governments in this connection.

The World Plan of Action will serve as a guide for the United Nations family and, it is hoped also, for Governments of developed and developing countries, and for other international organizations such as Pugwash.

MEETING OF THE PUGWASH STUDY GROUP ON EUROPEAN SECURITY

The 5th meeting of the Pugwash Study Group on European Security took place in Zagreb from 21st to 25th February 1967. The following took part: V. Hajdu, T. Nemec, A. Snejdarek (Czechoslovakia); D. J. Adler (Denmark); J. Delbrück, E. Menzel (F. G. R.); A. Joxe (France); P. Hess, A. Kolesnyk (G. D. R.); P. Freydenberg (Norway); V. Hanga (Rumania); R. Björnerstedt (Sweden); A. de Reuck (U. K.); V. A. Vinogradov (U. S. S. R.); J. Andrassy, L. Mates, E. Pusic, I. Supek (Yugoslavia). Professor G. Burkhardt participated as an observer on behalf of U. N. E. S. C. O., and Dr. J-P. Stroot as an observer from C. E. R. N.

The main purpose of the meeting was to review the recommendations to the Study Group from the 16th Pugwash Conference in Sopot. Topics discussed were (a) non-proliferation treaty; (b) science policy studies; (c) general problems of European security. Reports on these three topics were adopted by the Study Group. The report on non-proliferation is given below. There was also some discussion on the role of Pugwash in studies of these problems.

The next meeting of the Study Group will take place from the 13th to 16th May 1967, in Marianske Lazne.

REPORT ON THE NON-PROLIFERATION TREATY

We regard the present attempts to agree on a treaty against proliferation of nuclear weapons as very important, both in the context of European security and in connection with a universal development towards arms limitation and, eventually, general and complete disarmament. In the present situation there is, therefore, every reason to continue the political and scientific discussion of the different aspects of a non-proliferation treaty, including the need for, or the desirability of, a number of collateral measures, whether they be concerned with nuclear or other weapons. The relevance of such a discussion is also made obvious by the existing differences of opinion, ranging from questions regarding the intrinsic value of preventing a further nuclear spread to fears that a non-proliferation treaty may introduce a commerical monopoly in the future development of the peaceful uses of nuclear energy. Many points need clarification and in some cases this may necessitate a thorough study. We consider this conclusion to be valid whether a treaty is signed in the near future or not. On the one hand, continued effort towards a treaty would be helped by work of the kind mentioned, and on the other, many problems will remain unsolved even after the signing of a treaty.

If, as a first step, the current arguments for and against a non-proliferation treaty are to be scrutinized, we recognize that a considerable

number of studies do exist on a national basis, and that international scientific discussion will be promoted in the near future by the establishment, under U. N. auspices, of an expert group dealing with questions of direct relevance to nuclear problems. Due to the great complexity of the problem, national studies may contain some elements of bias. The U. N. expert committee is scheduled to conclude its work in half a year's time, which in some ways may restrict the scope of its reports and the depth of its study. On both these points, we therefore consider it appropriate to put forward recommendations for future international work and discussion among scientists.

The concept of a non-proliferation treaty is here considered to imply two separate aspects. On the one hand, such a treaty should put an effective end to the further spread of nuclear weapons, whether this spread would be a result of indigenous production or nuclear weapons dissemination. On the other, it should be clearly understood that the unanimous or near-unanimous signing of the treaty does not constitute an end in itself, but a challenge to all powers, nuclear and non-nuclear, to make continued progress in the disarmament negotiations.

The usefulness of a non-proliferation treaty should be considered in the context of the past and future aspects of the stability of world security. Although the nuclear power balance has not broken down in the past, we consider that this fact cannot be taken as a guarantee in any way that the future may not bring a nuclear holocaust. It is an important argument for a non-proliferation treaty that it signals the start of a development away from reliance on nuclear weapons as guarantors of world security. The usefulness of a non-proliferation treaty in this respect appears to us as a very important and decisive consideration. There may, however, exist instances where this factor is not given proper weight, as national security problems present a very complex equation, the solution of which is made even more difficult by the introduction of nuclear unknowns. In our view, the general area of national security policy may, therefore, constitute an important field for scientific discussion and study, both in general terms as well as through the conduction of case studies. Both these approaches could usefully be taken up inside an international work format.

Several arguments against a non-proliferation treaty have been raised through the years. Although we wish to underline the desirability of a non-proliferation treaty, there is also every reason to stress the importance of other collateral measures and the interrelation and interdependence of these different avenues towards disarmament. The question of other measures will, therefore, be taken up in the following, but it seems necessary to deal first with some arguments against the desirability <u>per se</u> of a treaty. These arguments may be of importance irrespective of the level of nuclear armament in the future world.

The first argument to be mentioned has to do with the alleged

importance of the scientific and technical benefits (the so-called "spin-off") accruing from a nuclear weapons development programme. The argument is most often raised not by nuclear scientists, but by the non-specialist. Although it may have had some validity in the very early years of nuclear development, when new and fundamental principles of nature were discovered, it is not relevant today. The basic principles are now common knowledge, as are actually also many applied results of interest to nuclear weapons design. If anything, one might express some astonishment that the nuclear powers have declassified so much information of potential use for weapons designers. The remaining secrecy mainly concerns design features that are sometimes classified as "more bang for the buck". One exception may perhaps be of some importance, namely methods of igniting hydrogen bomb explosions. This exception could be of some relevance for nations aspiring to make a concerted effort with regard to the peaceful use of fusion energy, but this is a field of "big research" that to a large extent has become a monopoly for the major powers, the reason being one of cost rather than lack of information. In our view this argument against a treaty is not valid and no extensive studies are called for to substantiate this point. What maybe needed, however, is a unanimous statement to this effect by an international group of trusted scientists.

A second argument is concerned with the possible peaceful use of nuclear explosives. It is argued that a non-proliferation treaty may hinder the development of peaceful explosives, or put the non-nuclear nations before a major power monopoly in this area with all the implications this may have, politically and commercially.

In this area there exists already a considerable body of knowledge, largely through American work, that has been made public. Because of the radioactivity created in nuclear explosions, the peaceful use of these is a difficult and delicate undertaking. Many arguments have, therefore, been put forward, for or against the possibility of developments of practical significance. We venture to draw a number of conclusions: firstly, the widespread application of peaceful nuclear explosives is neither so imminent nor proven to carry such promise as to warrant, at the present stage, the foregoing of the possibility of a non-proliferation treaty. Rather it seems to be an unnecessary negative attitude to presume, already today, that if peaceful nuclear explosives should become a practical and competitive proposition in the future, it would not be possible then to find ways for the international community to take advantage of this development. We consider these conclusions to be in need of further elaboration, and recommend that an international seminar be arranged for this purpose and the results widely publicized.

The third argument of relevance here, is concerned with the implications of a non-proliferation treaty for the peaceful development of nuclear energy. In this field it has now become evident and generally accepted that nuclear energy is competitive in many instances with conventional energy sources. The future consequences

will be of great importance in terms of a growing nuclear industry for which commercial considerations will be valid, especially when considering the international character of the power market. The knowledge acquired in a nuclear weapons development programme does not play any decisive role in the nuclear power development. In the past the connection between the two parts was that the military programme has been used as a vehicle to promote the interests of the power industry, in effect subsidizing the peaceful development. It does not seem to be necessary to rely on such subsidies in the future, as the prospects of nuclear power are now clearly established on their own merits.

It is further argued that to be effective a treaty against proliferation must contain a provision of inspection and control. Such a provision would clearly be directed against non-nuclear nations. With regard to commercial interests, these nations may then have to operate at a disadvantage in relation to the nuclear industries of the major powers.

Of the three arguments presented, this last one appears to be the one carrying most weight at present. It could constitute a serious obstacle to the widespread signing of a treaty. We do not want to minimize the reasons for genuine concern about this argument, but we wish to point to the considerable operating experience that already exists with regard to reactor inspection which at the same time protects bona fide commercial interests. One should also point to the very real possibility that the instigation of a concerted effort in this field may be successful in establishing even better methods of inspection.

In venturing these conclusions, we are aware of the urgent need of further study of the problems involved. An international research effort seems to be acutely called for. As a start and to help in formulating the goal and methods for this work, the convening of another symposium may be an effective proposition.

After having considered these arguments against the desirability of a non-proliferation treaty, we wish to expound somewhat the question of what other collateral measures one may discuss and study from the political as well as the scientific point of view. This opens up a very wide perspective which has been discussed inside Pugwash for many years and from many different aspects.

It has already been pointed out by the Governments of non-nuclear powers that they expect of the nuclear powers further steps towards disarmament as a contribution to the furthering of the aims of the non-proliferation treaty. We have carefully considered the proposals which have already been made in these directions. It was unanimously agreed that the combination of measures and provisions directed against the proliferation of nuclear weapons with such collateral actions by the nuclear powers would greatly accelerate the signing of the treaty and its implementation in the future. It was stressed that the consideration of the role of other collateral measures should be governed by a strict adherence to the Zorin-McCloy principles, so as to avoid a disturbance

of the balance in Europe.

The best possible solution would be the simultaneous conclusion of parallel treaties, covering as wide as possible a range and substantial ground in the field of general disarmament and, in particular, nuclear disarmament. Proposals to this effect submitted to the Disarmament Committee of the United Nations have, therefore, met with our understanding. It was emphasized that this course, always recommended by Pugwash Conferences, could lend the strength and authority to a non-proliferation treaty which is needed for a permanent prevention of the armaments race and its consequences.

It has also been realized that it is essential to conclude a non-proliferation treaty as soon as possible, particularly in the European region. This view has been founded on the argument that the difficulties for the agreement on non-proliferation have increased in the course of the last few years and that the opposition against the treaty has increased. Every consideration of collateral measures and parallel treaties must, therefore, be carefully balanced against the negative effect of a possible loss of time and a further increase in the difficulties to secure the adherence of all those Powers who could, in whatever way, produce or acquire nuclear weapons.

We feel, therefore, that the problem requires a careful examination of all the relevant circumstances, as well as a thorough study of the effects of the various measures and courses connected with the treaty. We have not seen the draft treaty negotiated between the two major powers and could, therefore, express no specific opinion on the provisions of the proposal, or on the required collateral actions. The views expressed in this respect reflect only general considerations related to the problem of non-proliferation rather than to a specific draft.

In the first place, we thought that it might be difficult to obtain the required adherence to the treaty and, even more, to assure the observance of a non-proliferation treaty over a long period of time if it should be limited to the preservation of a nuclear monopoly of a small number of countries only. Moreover, we felt that this could in the long run cause tense relations and contribute to difficulties in international relations.

The renunciation of nuclear weapons by the non-nuclear powers must be paralleled by obligations accepted by the nuclear powers. The extension of the test ban to explosions underground has been particularly mentioned. This step would contribute to halting the race in nuclear armaments and, in particular, the race in the development of new weapons. Reference has been made to earlier discussions in Pugwash Conferences and it was agreed that this particular measure deserves new consideration and study in the light of new scientific developments and the changes in the political situation.

It was further emphasized that the problem of nuclear-free zones in Europe and in other regions of the

world deserves special attention, not only as a contribution to the strengthening of peace per se, but also in the context of the problem of non-proliferation. This applies particularly to areas close to centres of high tensions and concentrations of armaments. Reference was made to earlier proposals concerning nuclear-free zones in northern, central and southern Europe.

We have also examined other fields and have found that measures which fall within the category of preliminary measures, such as freezing of defence budgets, freezing of the productions of weapons, renouncing the use of nuclear arms, guarantees to non-nuclear countries, and many other steps aimed at an easing or ending of the armaments race and international tension, could contribute to the strengthening of the non-proliferation treaty. It was agreed that these questions deserve to be studied together with the above-mentioned points.

All these questions and measures have been considered in the context of the problem of non-proliferation but it was recognized that they are independent components of the general complex of measures aimed at attaining general disarmament.

Finally, we have seriously examined the problem of security of non-nuclear countries in the presence of nuclear weapons under the control of countries considered as possible aggressors. We came to the conclusion that the apprehension of those countries is undoubtedly legitimate, but it was also agreed that the acquiring of nuclear weapons and the opening of the way to indiscriminate proliferation would not create more security. Although the balance between the two nuclear powers has, so far, to a large degree contributed to the prevention of major wars, it is felt that mankind should not rely solely on this factor but seek to improve international relations in all respects and, in particular, through steps towards general disarmament.

The two fields in which collateral measures could be undertaken should be separately studied in appropriate ways. Scientific problems related to the test-ban, nuclear-free zones and related questions, or the scientific elements of these questions, could best be studied by expert research groups, teams or institutes. We, therefore, expressed the view that it is urgently needed to stimulate these studies and to examine the results at the forthcoming Pugwash meetings. The political problems could be usefully examined in special seminars or discussion meetings on the basis of carefully prepared political analysis. The organizing of such seminars should be one of the main tasks of Pugwash.

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