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C O N T E N T S

THE 15th PUGWASH CONFERENCE

Africa Hall in Addis Ababa was a wonderful setting for the first Pugwash Conference to be devoted mainly to the problems of developing countries. Pugwash Conferences had achieved some measure of success in the past in discussion of problems of East-West conflict and disarmament. It was a matter of conjecture whether they could contribute significantly to the problems of aid to developing nations, in view of the many other technical conferences which were held on the same subject at very high level. But, although it is still too soon to estimate the effect of the Conference, those who took part were conscious that the Pugwash approach shed new light on many of the problems.

Because of the change in topic of the Conference, more than half of the participants were at a Pugwash Conference for the first time. The impression of splendour and respectability which they gained must have contrasted sharply with that of the participants of the first few Pugwash Conferences.

In Addis Ababa the hospitality and organization were delightful and efficient. The Conference was sponsored by the Haile Selassie I Foundation and the Haile Selassie I University. Africa Hall accommodates about every two weeks international conferences much larger and perhaps more important than Pugwash, but the attention which was given to every step of the formal and informal arrangements made us feel very special.

The formal opening by the Emperor Haile Selassie set the tone of the Conference with the exhortation to turn away from the waste of resources on armaments towards the solution of the major problems of starvation and poverty. The problems to be solved in the best use of science for the developing countries are so imminent and large that there was little evidence of East-West or ideological conflict, either in the formulation of the problems or in the suggested solutions. It was probably salutary to those experienced in East-West negotiations to realize the genuine disinterest and non-involvement of the developing countries in those problems which are considered to be the luxury of the big powers. Even the problems of Rhodesia and Vietnam, although discussed in the context of non-proliferation and steps towards disarmament, did not overshadow or negate the constructive discussions.

The Conference was a big step forward for Pugwash. New subjects, new approaches had been made, but the type of free discussion among scientists remained the same. Much more time was devoted to Working Groups, and the time spent in drafting agreed reports was significantly reduced, although even the present arrangement cannot be considered as the final solution.

The hospitality at the Ghion Hotel, the day-trip to the Blue Nile, the New Year seen in at the University with an Ethiopian-style dinner and music, and the reception given by the Emperor, were memorable. But the most exciting part of the 15th Conference was to see Pugwash move to a new continent, with many new participants, and new subjects to tackle, and still retain the best characteristics of Pugwash.

P. J. L.

STATEMENT

on the 15th Pugwash Conference
on Science and World Affairs

issued by the Continuing Committee

The 15th Pugwash Conference was held in Addis Ababa from the 29th December 1965 to 3rd January 1966. It was attended by 86 scientists and scholars from 31 countries drawn from all the continents. The theme of the Conference was "Science in Aid of Developing Countries". A mutually stimulating exchange of ideas and information took place between participants from the developed and developing countries. It became abundantly clear in the course of the Conference that Pugwash-type discussions are of great interest to scientists in both the developed and developing countries, and that further meetings dealing with the same or related topics could be very profitable.

The work of the Conference was carried out in five Working Groups. Four of these Groups dealt with a wide range of topics relating to the role of science in development, in Africa, Asia and Latin America. The fifth Working Group dealt with problems of security, including current conflicts. The five Working Groups submitted their reports to the Conference as a whole. This statement has been drawn up by the Continuing Committee on the basis of these reports.

Groups 1 to 4 inclusive were concerned with many aspects of the application of education, science and technology to development. There was a general consensus of opinion among them on the crucial importance of a number of technical and political factors which were inhibiting development.

Building up education, science and technology, all indispensable for development, is an expensive process. It is unrealistic to believe that sufficient resources will be made available for their support in the absence of very substantial measures of disarmament on a world-wide scale. A second crucial factor for a developing country is its economic and political independence, and, for many of them, the introduction of radical socio-economic reforms.

A general agreement was also present in the Groups that scientists should be encouraged to play an active part in the social and political life of a developing country, and in helping to solve the urgent problems facing the nation in the sphere of development. The universities were regarded as particularly important in the early stages of development. They are the primary source of new scientists, teachers and advanced technical personnel; they bring together many disciplines, including the natural and social sciences and humanities; and given sufficient autonomy they can provide good conditions for penetrating independent enquiry. The proper support and improvement of

existing research institutions relating to the economy, in the early stages of development, was also stressed.

It was generally agreed that support for science and technology in the developing countries by the developed countries is an important contribution to world development. It helps to reduce the political tensions which can result from the growing disparity between standards of living in rich and poor countries. And it enriches world science by bringing to its support the abilities and cultural heritage of many peoples previously alienated from it. It is, therefore, of mutual advantage for rich and poor countries.

1. Education in Developing Countries

To rectify the chronic shortage of school teachers in most developing countries, the Group recommended a massive programme for the training of science teachers, either on a national or regional basis, and with financial help from developed countries, international organizations and foundations.

The Group also stressed the need to improve the salaries and conditions of service of teachers. To meet the crucial role of science for development, there should be a higher proportion of science students among the student population of a developing country, and provision should be made for a rapid growth of science teaching in schools. The Group also stressed the importance of ensuring, as soon as possible, that a large proportion of the teachers, scientists and technologists of a country should be drawn from the indigenous population. The manpower needs of a country in this respect should be estimated both for the short and the long term. For political reasons and on grounds of economy, an increasingly large core of indigenous teachers should be employed as soon as practicable on the staff of training institutions. This will have the additional advantage of increasing the stability of the staff.

It is very important to strengthen the training institutions and universities in developing countries. This may be done by attracting good personnel, by improving the quality of their research, by encouraging exchanges of staff with both developed and developing countries, and by encouraging people from developed countries to undergo postgraduate training at universities in developing countries. When students are educated abroad, it is important that their qualifications should be effectively evaluated on their return home, and steps taken to ensure that they find an appropriate position.

A very important objective of the educational system of a developing country is to inculcate a questioning, critical and experimental attitude to all knowledge, and especially so in the universities. Such an attitude is essential for the generation of new ideas vital for the solution of all the novel problems facing a developing country. In view of their responsibilities, the training of teachers should be very carefully planned to foster the spirit of vigorous independent enquiry.

2. Organization of Scientific Institutions and Research in Developing Countries

The developing countries are at widely differing stages in the advancement of science. They vary, for

example, in the availability of scientific manpower and equipment, the degree to which science is organized, and in the size and quality of the supporting educational system. Ready made plans which would suit all countries cannot, therefore, be provided; they have to be worked out and fought for in the situation prevailing in each country. In considering the planning and co-ordination of scientific research in developing countries, the Group considered that some type of advisory body at the highest level of government, responsible to the Cabinet and not under any particular minister, was necessary. This body should consist of representatives of government departments, industry, academies and universities, and research institutes; it should have a high proportion of active natural scientists and some social scientists.

The organization of research should be designed to liberate the creative energies of scientists and provide them with what they need for effective work. A rigid bureaucratic organization which does not sufficiently devolve responsibility on working scientists leads to grave frustrations among them and should be rigorously avoided. There are great advantages to be gained by the development of a team spirit, a multidisciplinary approach, the efficient use of equipment and a proper evaluation of research. In the early stages of development, efforts should commonly be directed towards the solution of urgent national problems; and they should be selected only after a realistic appraisal of the resources available for the execution of the work.

The Group emphasized the importance of the integration of science and scientists into governments. A senior scientist should sometimes be prepared to give up his research work for a period, in order to accept a post in the appropriate branch of government service. He may thus actively participate in creating a better understanding in high governmental circles of the role of science, help in formulating national plans, and, in addition, acquire some insight into the problems of government.

The Group also stressed the importance of international collaboration at all levels, welcomed the action already taken to promote it by international and other agencies, and recommended its extension in a wide variety of forms.

3. Scientific Approach in Aid to Developing Countries

In discussing the scientific approach to aid, the Group stressed that all aid should contribute to increasing the self-reliance of the receiving country and its capacity for independent growth, and that the latest advances in science and technology should be imaginatively employed to promote such a development. Programmes originating from demagogic or narrow political considerations, or from group interests, ought to be discouraged.

Aid should involve no interference in the internal affairs of the country. It should not be used for political advantage by the donor nations, nor should competition in aid be used as a means of exerting political pressure by the receiving nations. If many past failures in aid programmes are to be avoided it is important to ensure the continuity needed for their completion. A close correlation should be established between the training of personnel and technical development

programmes, to ensure both the adequate staffing of new facilities and institutions and the full employment of graduates.

Aid programmes should be planned to safeguard the best aspects of the indigenous culture and technology so that a dull standardization of cultural patterns may be avoided.

In order to implement these principles, the Group made a number of practical recommendations, including greater support for the work of the U. N. and its agencies, particularly ECOSOC's Advisory Committee on the Application of Science and Technology in Development; better organization in developing countries for the scientific survey of their needs; and formulation of requests for aid through a national planning authority and a scientific advisory council. In some areas, particularly Africa, such bodies might be established on a regional or continental basis.

"Twinning" of institutions in developing countries with those in advanced countries, as well as pairing of scientific institutions from East and West in giving assistance to the programmes or to institutes in developing countries, was warmly endorsed.

Scientists in the developed countries should be encouraged to show greater interest in working, at least for limited periods, in developing countries, and procedures should be elaborated to avoid any consequential damage to their scientific careers. The scientific communities of all countries should cooperate to keep aid mechanisms under review, and to assist in finding highly qualified scientists for this work.

4. Specific Problems of Developing Countries

Economic assistance of developed countries to the developing ones, however important, taken alone can have only a marginal effect. Even if relaxation of international tension would release additional resources for this assistance, the rate of economic growth in developing countries will remain largely dependent upon their own determination and effort. Both in planning for economic development and in implementation of the plan, scientists should play a far greater role in the future than they have in the past.

Industrialization is a key factor in development. Increased participation of scientists in industrial planning, concentration of industrial effort, the coordination of industrial with agricultural development, and the creation of integrated markets to solve the problems of small countries, are all necessary to accelerate industrial growth.

In the next ten or fifteen years there is a grave danger of a broadening of the gap between the growing population and the production of food in the developing countries. Merely to maintain the present meagre standards of food consumption, a great increase in agricultural production in the developing countries, with better water supplies, fertilizers, pesticides, better seeds, and greater incentives to farmers, will have to take place. It will also be necessary to augment local supplies by food aid from developed countries which have excess capacity in food production.

Shortage of proteins in the diet causes grave diseases and reduces

physical and mental activity. It can be mitigated by increasing the productivity of protein-rich crops, by improving the quality of plant proteins by addition of synthetic amino acids, by cultivation of micro-organisms not only in familiar media but also in petroleum and coal products, and by the increased use of fish and of wild mammals.

The natural resources of the earth are sufficient to support a very much increased population, but this will only be realized if technology and human effort can be combined with capital investment, greatly to increase agricultural and industrial production. The needed increases in production are severely inhibited by rapid rates of population growth and the imbalance in age groups which results from it. Experience is being gained in several developing countries with new techniques of fertility control, but the Group emphasized that this control alone is not the solution. Continued reliance must be placed on increased production in developing countries, and on aid from developed countries.

The development of water resources is important for agricultural and industrial growth, and for better standards of sanitation and health. Scientists should play an increasing role in the investigation of water supply potentials, and in water management. There is also a great need for increased co-operation among countries sharing riparian rights.

Natural resources must not only be developed but also conserved. Scientific research and assistance in preparing and managing conservation programmes is imperative. This requires a high degree of international co-operation. Active participation of scientists from developing and developed countries in projects such as the International Biological Programme and the International Hydrological Decade is, therefore, of great importance.

5. Security Problems of Developing Countries

Security in the developing countries and regions is an integral and important part of world security.

The Attitudes of Developing Countries towards Security Problems

The security of developing nations is gravely endangered by acts of interference, covert or overt, in their internal affairs, as well as by any form of colonialism. Many developing countries have frontier problems as a result of the division of tribes by boundaries drawn by the colonial powers. Every encouragement should be given to the peaceful settlement of such disputes. The appropriate scale of armed forces in a developing country depends upon local circumstances. However, it is clearly necessary for each country to limit armaments and to give economic development first priority.

Economic Burden of Armaments on Developing Countries

Even a small defence expenditure is a serious burden on a developing country. It drains financial resources, especially foreign exchange, and makes demands on the limited reservoir of technically trained manpower. Any considerable expenditure on the armed forces is liable to threaten national development plans and bring about a risk of inflation.

Current Conflicts

(a) Vietnam. The escalation of the war in Vietnam is inflicting terrible suffering on the Vietnamese people, and constitutes a threat to the peace and security of the entire world.

With regard to the nature of the conflict and the ways and means for its settlement, different opinions have been expressed which make it impossible to come out with a general statement on this issue. It is suggested, therefore, that all the participants should inform their respective governments of the views expressed, indicating to them the urgent necessity of taking energetic measures to restore peace in Vietnam. This can be achieved by adhering to the Geneva Agreement of 1954, which would provide the Vietnamese people with the possibility of deciding their own destiny.

(b) Rhodesia. The question of Rhodesia, though of a different nature from that of Vietnam, was considered. It was agreed that the present situation is unjust and oppressive for the majority of the population of Rhodesia and that strong steps should be taken to bring down the illegal Smith regime, with a view to early majority rule.

The Group agreed that the African people of Rhodesia should be given all possible help and support in its just struggle for independence and national rights. Strong support was expressed for the U. N. resolutions adopted by the 20th Session of the General Assembly on the question of Rhodesia.

(c) The Group expressed the hope that the initiative of holding negotiations in Tashkent, between the Prime Minister of India and the President of Pakistan, will be instrumental in bringing about a peaceful settlement of the conflict between the two countries.

Role of the U. N. in the Security of Developing Countries

The big powers, acting in concert with developing nations through the U. N. in conformity with its Charter, can play a crucial role in helping to resolve disputes, in stopping local conflicts, and in the reduction of the burden of armaments in developing countries.

The Group welcomed the Declaration of December 20, 1965, adopted by the 20th Session of the General Assembly of the U. N., which provides a charter for the non-intervention by one state in the affairs of another, and for peaceful co-existence of states. The Group urged the members of the U. N., and particularly the big powers, which have a special role in the Security Council, to activate all provisions of the U. N. Charter, including Chapter VII, designed to provide effective support for the security of countries against whom force is threatened or used by another country.

It was suggested that the cost of peace operations could, among various means, be recovered by U. N. regulation and taxation of the use of oceans, atmosphere and outer space for communications or telecommunications, and of the exploitation of mineral resources under the oceans.

Regional Organizations and Security Problems

The Group recognized the great value of regional organizations for promoting peace, economic and social development, and for aiding the resolution of political questions. It took note of the valuable role played by the Organization of African Unity, for example,

by securing recognition of existing boundaries, and mediating in the dispute between Morocco and Algeria.

The Group believed, however, that the U. N., rather than regional organizations, should provide collective security. This is because the positive development role of regional organizations may be impaired and the unity of the organizations subjected to excessive strains if the organizations are called upon to undertake military action.

The Role and Responsibilities of Nations for promoting Security

The Working Group firmly believed that all states, both developed and developing, are directly responsible for peace and security in the world, since an armed conflict in one area endangers the security of nations in other areas.

In the long run, the security of all nations requires the achievement of an agreement on general and complete disarmament under strict international control. The Group recommended that the Eighteen Nation Disarmament Committee begin serious and detailed consideration of the G. C. D. treaty, possibly starting from those aspects, in the later stages in both the Soviet and American draft treaties, in which a fair measure of agreement now exists.

In the meanwhile, pending agreement on G. C. D., partial measures should be undertaken for reducing armaments and strengthening the peace.

The Group drew attention to the positive role of co-operation and mutual interdependence of countries in promoting security. Sharing the benefits of common projects, on which the economies of two countries are vitally dependent, may be a strong deterrent to armed conflict between them.

Non-proliferation of Nuclear Weapons

The Working Group discussed various aspects of the problem of preventing further proliferation of nuclear weapons. It agreed that further spread of nuclear weapons is fraught with grave dangers to the security of all nations.

The Group firmly believed that it is high time to take resolute action aimed at concluding a non-proliferation treaty which would have no provisions that could, directly or indirectly, lead to the spread of nuclear weapons. Urgent steps are called for to increase the number of signatories to the Moscow Test Ban Treaty and to extend it to underground testing. Effective measures must also be taken to establish nuclear-free zones.

The Reports of Working Groups 1, 2 and 3, as well as the abstracts of some of the papers given at the Addis Ababa Conference, are printed in this issue. The remaining abstracts will be printed in the next issue, together with the Reports of Working Groups 4 and 5.

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C.

REPORT OF WORKING GROUP 1

EDUCATION IN DEVELOPING COUNTRIES

1. Principles

1.1. It is recognized that economic development in any country cannot proceed satisfactorily unless education, science, and technology are advancing at the same time. Unfortunately, most developing countries cannot afford the high cost of rapidly developing these simultaneously and, therefore, their economic development is retarded. There are two prerequisites to breaking this so-called "vicious circle": the first is by the introduction of radical socio-economic reforms; the second is by striving to achieve economic and political independence.

1.2. Since universities generally form the central core of intellectual life, and because universities and government institutions are subject to simultaneous growth in developing countries, leading scientists should be encouraged to participate actively in social and political life. Some of them should become part of the government and administration, where they can exert direct influence on policy decisions and help to establish science and technology as a vital prerequisite to successful nation building. At the same time, it will be necessary to educate the people, the press and governments of developing countries, on the importance of science and technology in the development of their nations, and the important place scientists should occupy in society.

1.3. It is necessary to eradicate illiteracy in developing countries within the shortest time possible. This is a vital task for developing countries in order to open the door to progress and to enable the proper planning of education at secondary and higher levels. It is also recognized that science is universal, and no discrimination based on race or nationality, creed or sex should be practised in education and social life.

2. Planning of Science and Education in Developing Countries

2.1. In most developing countries there is an urgent need to build up scientific and technical manpower at all levels; without this the exploitation of their natural resources and economic development would remain unsatisfactory.

2.2. One of the reasons for the scarcity of scientific manpower in developing countries is the lack of a science planning policy. In some countries the imbalance between science and arts students in the secondary schools ends up in a situation where too few students get enrolled in the science faculties at university level.

2.3. An important reason for this situation is the shortage of qualified science teachers and necessary laboratory facilities. The Group recommends that a beginning be made to rectify the situation by:

(a) mounting massive science-teacher training programmes for primary and secondary schools in each developing country or on a regional

basis, with the assistance of developed countries, foundations and international organizations to provide the necessary training staff and equipment;

(b) stipulating in the national development plan of each developing country that there should be a higher proportion of science students in the final two years at secondary school; moreover, such a provision should be made for the accelerated development of science teaching either at secondary schools or at special well-equipped science teaching centres with the advice of the local universities;

(c) improving the salaries and other conditions of service of science teachers in order to attract and retain them in the teaching profession;

(d) designing and preparing science and mathematics syllabi and textbooks which are adapted to local conditions, and which could effectively be introduced in primary classes, for example, along the patterns that have been prepared by U. N. E. S. C. O., taking advantage of modern audio-visual aids;

(e) encouraging the formation of local teachers' associations, within which science teachers chapters could be established, and which could promote, in collaboration with other bodies concerned, the healthy development of science teaching in schools;

(f) establishing, with the collaboration of developed countries, a few regional institutes of higher technological education and research which would have standards of excellence equivalent to those of the best institutions in the advanced countries.

2.4. In order to increase national consciousness of science, developing countries should, as soon as possible, form National Research Councils.

2.5. Continued and increased efforts must be made to raise the 1980 target for student enrolment in institutions of higher education in Africa, as proposed in the 1962 U. N. E. S. C. O. Tenanarive conference. It is recognized that this would necessitate changes in the development of primary, secondary, and adult education, and in the rate of creation of adequate avenues of employment of the extra graduates through appropriate socio-economic, industrial and agricultural planning in the countries concerned.

2.6. Developed countries should earmark a portion of the savings resulting from disarmament, which should be agreed upon, for diversion to assist the educational programmes in developing countries.

2.7. Finally, since literacy and general education are the means for opening the gates of culture, women should share equally with men the benefits of all literacy and educational programmes in developing countries.

3. Training of Scientists, Technologists and Technical Personnel for Cultural and Economic Development

3.1. For stability, continuity, and for political as well as for economic reasons, a significant core of qualified indigenous teachers should be employed in training institutions in developing countries. Indigenous teachers are likely to know the weak areas in the backgrounds of their students and the remedial measures that could be taken. However, it will

always be desirable to include a few expatriates on the staff, carefully selected for their personal qualities.

3. 2. The local personnel to be trained should be for the whole spectrum of posts requiring a scientific or technical background. The training of the personnel will have to be a combined effort of universities and other training and research institutions. It is recommended that developing countries should conduct surveys both of their short and long term manpower requirements.

3. 3. Ideally, all local professional and technical personnel for developing countries should generally be trained in the country or region concerned, so that they should not get out of touch with the environment in which they would be working later. Therefore, the Group recommends that every effort should be made by each developing country, either to staff and equip its training institutions adequately, or to create them where they do not yet exist. However, it is urged that research should be done into all training methods before they are introduced in developing countries.

3. 4. It is accepted, however, that the training of personnel for such highly technical professions as engineering will, for some time, require either apprenticeships or postgraduate training facilities being made available in the more developed countries for nationals of developing countries. In addition, developed countries should help in arranging for and financing refresher courses, seminars, and study tours for scientists and technical personnel trained in local institutions.

3. 5. The training of university teachers, research workers, professional personnel and technologists in developing countries cannot be done satisfactorily before the universities and other training or research institutes in these countries are adequately equipped and well staffed. To achieve these objectives, the following recommendations are made.

(a) The teaching and research staff of universities and research institutes in developing countries should be strengthened and stabilized through the following measures:

(i) developing countries should offer salaries that will attract and retain indigenous staff in the universities and research institutes. In addition, in view of the fact that the quality of research bears a direct relationship to the quality of teaching at undergraduate level, developing countries should finance research as generously as possible;

(ii) it is recognized that developing countries will continue to send their students for postgraduate training to the most appropriate and best centres in developed countries. However, where possible, nationals of developing countries should be encouraged to do their postgraduate work at universities either in their own countries or in other developing countries with similar backgrounds and environment and where facilities exist for their postgraduate programmes;

(iii) the exchange of staff with developed countries as well as among developing countries themselves should be encouraged, as it promotes international understanding and the

exchange of scientific knowledge and techniques.

(b) The training of university personnel of all grades cannot be satisfactorily done in developing countries unless appropriate staff and equipment are available. In this connection, it is recommended that:

(i) developed countries be invited not only to help in the procurement of the necessary staff and laboratory facilities for developing countries, but also to award to their own nationals postgraduate fellowships tenable in the developing countries, as well as undergraduate scholarships to nationals of the developing countries tenable in those countries. Special and generous allowances for the purchase of research equipment should be associated with each postgraduate fellowship;

(ii) funds from all sources designed for the establishment of research institutes and fellowships should preferably be channelled through an appropriate international agency.

3.6. In connection with the aid given by developed countries for training institutions in developing countries, as well as for scholarships and fellowships, the Group recommends that the economic assistance to developing countries be taken out of the context of the cold war. The countries of the East and West should co-operate so that duplication of training programmes in developing countries could be avoided. In addition, the nationals of developing countries should be free to pursue their undergraduate or postgraduate studies in any developed country where there are appropriate facilities, and their governments should not place any obstacles in their way for either political or ideological reasons.

3.7. There are other general points indirectly connected with the training of scientific and technical personnel that need mentioning. After the staff have been trained, their effective utilization and retention on the jobs for which they were trained is extremely important. There are various possible solutions to this problem, but the following is suggested: it might be necessary to bond those students who have received scholarships from public funds so that they must serve their countries for a fixed minimum period after graduating. In this connection, there should be a proper follow-up of students from developing countries, culminating in an objective evaluation of their qualifications on their return home with a view to placing them in an appropriate post.

4. Development of the Academic Spirit

4.1. While it is true that the most pressing problems in developing countries concern the eradication of ignorance, poverty and disease, it is equally true that their solution depends on the adoption of a new analytical philosophy. The Group is of the opinion that a purely acquisitive attitude to knowledge, without critical evaluation of the knowledge or the development of a curious and questioning attitude, will not generate new initiatives and ideas that might lead to a solution of the various problems in developing countries.

4.2. It is the reflective, questioning, critical, investigative and experimentally orientated attitude that might be called "the academic spirit". This

would prevent the unquestioned adoption of existing ideas and lead to new solutions to outstanding problems. Although it is true that the academic spirit is best created and nurtured in universities, it is necessary to develop it at all levels in the educational systems of developing countries. Because of the various types of authoritarianism that the peoples of most developing countries have been subjected to in the past, colonialism being the most important, there is a particular need to develop the academic spirit in developing countries.

4.3. Since the teacher is the main tool for the development of the academic spirit, the Group recommends that teacher training programmes in developing countries should be imaginative, carefully designed and executed to develop the spirit in the teachers themselves during their training. It is further recommended that all teachers should undergo periodic refresher courses for the continued sustenance of the academic spirit.

4.4. However, in the process of developing and fostering the academic spirit, universities in developing countries should not become "ivory towers", unresponsive to the needs and conditions of their respective countries or regions.

REPORT OF WORKING GROUP 2

ORGANIZATION OF SCIENTIFIC INSTITUTIONS AND RESEARCH IN DEVELOPING COUNTRIES

1. Introduction

The developing countries are at widely differing stages in the advancement of science. They vary, for example, in the availability of scientific manpower and equipment, the degree to which science is organized, and in the size and quality of the supporting educational system. Ready made plans which would suit all countries cannot, therefore, be provided; they have to be worked out and fought for in the situation prevailing in each country.

Some general principles which can be applied to all countries engaged in the development of their scientific potential can, however, be distinguished and they are considered in the present Report. Before proceeding to details it may be remarked that support for science and technology as part of the development is not to be seen as an act of patronage. It is an important contribution to world development. It helps to reduce the political tensions which can result from the growing disparity between standards of living in rich and poor countries, and it enriches world science by bringing to its support the abilities and cultural heritage of many peoples previously alienated from it. It is, therefore, of mutual advantage for rich and poor countries and should be based on a two-way traffic between them.

There is an urgent need to educate politicians, administrators and the public, regarding the possible role of science and technology in social and economic development. It would, therefore, be desirable, and in the interest of science and technology itself, that a concerted effort is made in this direction.

2. The Planning and Co-ordination of Scientific Research

2.1 Types of bodies responsible for research policies

2.1.1. The majority of the Working Group felt that for the long-term planning of science, some type of advisory body at the highest level of government, responsible to the cabinet and not under any particular minister, was necessary. There was a fear, however, that the initiation of a science policy, before the emergence of a scientific community able to contribute to formulating plans, might result in rigid planning which would hinder the development of science.

2.1.2. Such a danger could be avoided by a three-stage development: in the first stage funds are allocated to existing institutions and to some specific projects; in the second, planning of research is directed to specific national problems; and in the third, co-ordination is made among existing institutions and a general science policy for the country is established.

2.1.3. The main aim of the advisory body should be to accelerate the development of science, and to ensure the best utilization both of the potentialities of the country and the means invested in research, for the rapid advancement of the country.

2.1.4. The advisory body should include representatives of government departments, industry, the universities, research institutes, and learned bodies, including both economists and scientists. As high a proportion as possible in all categories should be active scientists.

2.1.5. To be effective the advisory body should have a sufficient stability to ensure continuation of policy and projects.

2.1.6. A suitable machinery should be devised to ensure the implementation of existing laws covering the establishment of such an advisory body, its effective functioning and the verification of execution of decisions.

2.2. In the initial stages of development, projects must be chosen to make maximum use of limited resources. Early projects should be applied rather than basic, and they must be of immediate application to the solution of urgent problems. Nevertheless, fundamental research is also important. It is essential for the proper support and maintenance of advanced applied research and technology; in promoting the intellectual climate necessary for profound economic and social development; and for the healthy development of the basic sciences in the universities.

3. Forms of Organization of Scientific Research Centres

3.1. Types of research institutions

3.1.1. Each country should in due course develop a variety of forms of research institutions ranging from university and government research laboratories to independent research institutions, co-operative research institutions and research establishments for particular industries.

3.1.2. To solve urgent national problems in the field of agriculture, industry and other related areas, it would be necessary to establish specialized research institutes. These could

be multidisciplinary, commodity laboratories, or covering a special field of science, depending upon the needs and level of development of a country. The researches in these institutes should be primarily oriented to solve specific problems facing a country, organized on a project basis with definite time schedules in order to meet the urgency of the situation, and be effective. The institutes, and their researches, should be an integral part of the overall technological and industrial development of the country.

3.1.3. The universities, however, should provide the central core for the development of science in each country. They are the primary source of new scientists and advanced technical personnel; they bring together many disciplines, including the social sciences and humanities; and given sufficient autonomy they provide good conditions for penetrating independent enquiry. They are, therefore, in a strong position to contribute to an objective analysis of the problems facing a country and to finding solutions for them.

3.1.4. In order to accomplish these tasks, many universities in developing countries need a fundamental change to render them suitable to the requirements of modern science and to the role of science in social and economic development. Particular attention should be paid to:

(a) the need for a wide democratic basis of higher education, without economic, social or political impediments;

(b) the availability of means to keep, to train and to promote the best students who have shown ability and willingness to do research;

(c) the flexibility of academic structures, to allow for an increasing number of research staff and the quick promotion of talented young researchers;

(d) the interdisciplinary character of modern science;

(e) the selection of research subjects related to the needs of the country, taking into account the natural resources available and scientific and technical manpower, the stage of economic development and other relevant factors, including traditions and cultural patterns;

(f) the social responsibility of scientists in a modern society. This demands that universities be alive to the problems of the country, eager to participate in the formulation of national plans. This may also require a scientist to give up his research work for a period in order that he may accept a post in the civil service. He may thus actively participate in creating a better understanding in high governmental circles of the role of science, and in helping in the formulation of national plans, as well as acquiring some insight into the problems of government.

3.1.5. The Working Group discussed at great length the problem of the autonomy of universities. It was unanimously agreed that an important degree of autonomy was necessary to build up the type of institution as described under 3.1.4. But the Group was strongly against the use of autonomy to establish an "ivory tower" of universities, indifferent to the problems facing the country and unwilling to be involved in the search for their solution. It was felt that without damage to its

autonomy, a university could undertake projects for planned research on specific problems in direct collaboration with branches of government or sectors of industry.

3.1.6. In addition to the permanent role of the universities in the process of development, their responsibilities are particularly important in the initial stages of applied research. In the first steps towards industrial development, new fields of technological research, which in most advanced countries are taken care of by special research institutes under branches of the government or by private industry, can be established within the universities. They may become independent when they increase in size beyond a certain limit; but even then they should maintain close relationship with the university.

3.1.7. Research institutes in the developing countries can play a larger role through proper selection of projects, proper direction and best use of staff. In this manner they could comment upon the feasibility of development plans and recommend projects to the planners, and thus make research an integral part of the overall national development.

3.1.8. The Working Group felt that the relationship between research institutes and universities was adequately covered by Working Group 1 of the 14th Pugwash Conference, and it endorsed their recommendations.

3.2. The Internal Organization of Research

3.2.1. The internal organization of research would depend upon the affiliation of the institution - whether, for example, it is a government laboratory directly under a ministry, or an autonomous institution such as a university, or an industrial research laboratory.

3.2.2. Liberation of creative energies of scientists is vital to the health and vitality of science. A rigid bureaucratic organization, which does not sufficiently devolve responsibility on working scientists, leads to grave frustrations among them and should be rigorously avoided.

3.2.3. There are sometimes considerable advantages in organizing research on a project basis. It helps to develop a team spirit, a multidisciplinary and flexible approach to research, a more efficient use of equipment, flexibility and a proper evaluation of the projects.

3.2.4. The organization of research programmes as part of the plans for overall national development should be fostered, together with co-operation between government departments, institutes and universities. This co-ordination of effort should lead increasingly to research projects directed towards the production problems of the country.

3.2.5. The research projects should be planned on a realistic basis with due care given to selection of projects in relation to a critical appraisal of resources, including scientific and technical manpower, technical facilities and financial support.

3.2.6. Greater attention should be paid to increasing the number of technicians at all levels, and to developing the necessary auxiliary services for research. These include, for example, workshops, glass-blowing, and facilities for

maintenance, repairing and manufacturing apparatus. Personnel of sufficient calibre and in sufficient numbers will be attracted to these posts only if their economic and social status is improved so as to correspond to the social and scientific importance of what they are doing.

3. 2. 7. The need for good libraries, for documentation centres and information services cannot be overemphasized. The availability of existing knowledge to the people doing practical work in developing countries should be given the highest priority. The availability of this information should proceed in parallel with the creation of research institutes. These services should not only cover the standard information which is available in existing documentation centres. It would also be highly desirable to include information about availability and performance of scientific equipment in the international market. Since very comprehensive documentation centres are very expensive to maintain, the main task of information centres in developing countries should be to provide information about the sources of information.

3. 2. 8. The complexity of the work to be performed in science and technology in modern institutions, such as universities or other research institutes, makes it necessary to have "Science Administrators" of high capacity. Scientists holding posts of responsibility in such institutions should realize that considerable time and effort must be devoted to problems of organization.

3. 2. 9. To be effective, the organizations planning science must arrange the collection of important data and studies of various aspects of the organization of science. These should include the allocation of resources, manpower, and the verification of the execution of decisions and policies. It would be an advantage if such studies could be carried out in a way which allowed the results from different countries to be imported.

4. Regional Co-operation in Science and Technology

4. 1. The Working Group emphasizes the importance of all kinds of international co-operation, based on regional, bilateral or multilateral agreements, both among developing countries themselves and between advanced and developing countries, provided that the scientific and technological development of the country is not thereby subjected to external pressures. When soliciting advice on national problems, efforts should be made to invite experts from within the region.

4. 2. International and regional institutes may assume two different forms: a multidisciplinary centre located at a single place and serving several countries, or a network of national centres integrated into a single co-ordinated structure with decentralized functions.

4. 2. 1. Single regional institutes have proved to be successful only when the following conditions are fulfilled:

(a) they do not constitute centres of attraction drawing away the best brains from other countries; in this connection, a two-way relationship of the regional institute with the national centres of research, leading to a rotation of scientists, is strongly recommended;

(b) they work in special fields which are of vital interest to the participating countries, and which can only be developed in the area through such international co-operation;

(c) they do not duplicate local efforts, but rather make full use of existing centres and facilities;

(d) they are either located within a university, or have close links with neighbouring universities and national institutes working in related fields.

4.2.2. The integration of national centres into regional structures has the advantage of utilizing the best facilities available in each country. At the same time it helps the development, in the various participating countries, of existing centres specialized in particular branches of science and technology.

4.3. There are other forms of international co-operation within a region which are highly recommended, such as:

(a) the exchange of experts in fields where the participating countries have reached an advanced level;

(b) the regular meetings of specialists within a region;

(c) the regular exchange of information within a region and co-ordination of effort through meetings of science administrators from universities and research institutes;

(d) the provision of facilities for the exchange of fellowships in fields where countries within the region may complement one another.

4.4. The necessary financial provision for the exchange programmes for both staff members and fellows should be made. A scheme where the country sending the expert, the student or delegate, pays their salary and travel expenses, and the receiving country takes care of local expenses, may be found useful.

4.5. The Working Group strongly emphasized the importance of international contacts for scientists of developing countries, especially in countries where there are not yet adequate conditions for scientific work. In particular, the participation of scientists of developing countries in international symposia, scientific meetings of international unions or associations, and congresses or general assemblies of international organizations, such as ICSU or UNESCO, is highly recommended.

4.6. An important and very effective way of promoting scientific development is provided by the new forms of international co-operation set up through the programmes co-ordinated by UNESCO and/or ICSU. Some of these programmes, like the International Biological Programme, are highly interesting. They could be very useful for developing countries but have not yet found an adequate response.

4.7. International co-operation, as indicated in 4.1, and international contacts among scientists mentioned in 4.5 should not be subjected to hindrances on political, religious, racial, or other such grounds.

5. Concluding Remarks

The subjects included in the agenda of this Working Group cannot be studied in isolation from related problems whose solutions are prerequisites for the effective organization of

scientific research or technology in the process of development. It was agreed that the following ones ought to be mentioned as a complement to the report on the specific items of the agenda.

5.1. Science and technology cannot progress in less developed countries, nor can they have a role in bridging the gap that separates those countries from the rich ones, unless there are favourable political and economic structures and availability of financial means.

5.2. The development of science and technology is a long process that requires continuity of effort and stability of the institutions and the scientists engaged on it. The scientific potential of a country should not be at the mercy of changing political regimes. On the other hand, science is the result of international efforts, and scientists of all the countries ought to be concerned when in any part of the world scientific institutions and scientists seriously concerned with the development of their country are the victims of ideological discrimination.

5.3. Science is a form of capital which requires a longer time to build up than any other. To maintain and promote this potential in each country requires, among other things, that the government, as well as society as a whole, shall clearly understand the importance of scientific research for the whole development of the country. Such recognition will give scientists the social status and the prestige to stimulate their work, and prevent the migration of scientists to more advanced countries.

5.4. The development of modern science and technology is a very expensive enterprise which, in many developing countries, can only proceed with substantial international assistance. The budget of international organizations, such as UNESCO, is at present quite inadequate to meet the urgent requirements. World disarmament, partial or complete, has the immediate aim of securing world peace. But, in addition, it alone can provide enough human and financial resources to ensure that science and technology can be fully employed in bringing to all the peoples of the world a standard of living more nearly in accord with what is now technically possible.

REPORT OF WORKING GROUP 3

SCIENTIFIC APPROACH IN AID TO DEVELOPING COUNTRIES

1. Preamble

1.1. The Working Group was concerned with the scientific approach to aid in developing countries. The term "scientific approach" may have three meanings. On the highest level it means approach through observation followed by formulation of a generalization or theory, which is then tested by further observation or experiment. The Group is aware that this kind of approach may not be possible in the solution of any social problems, and those of development in particular.

1.2. On the second level, "scientific approach" means basing conclusions on the use of systematic observation and analysis, and particularly on the use of tools made available as by-products of scientific progress. The increased role of science and technology in society, and in particular in the transition of the traditional society into a modern technological one which is the purpose of developmental aid, calls for greatly increased application of this approach to aid programmes.

1.3. A third meaning of "scientific approach" is the evolution of a consensus of opinion of men with a scientific background, as many as possible of whom shall have had experience of the type specified in the preceding paragraph.

1.4. The Working Group is aware that a Conference such as the present one can use scientific approach only in the third sense, in the spirit of goodwill and without prejudice. The Group hopes, however, that conclusions arrived at by this Conference will stimulate the exploration of the possibilities of greater use of scientific methodology in senses one and two in planning and implementation of developmental aid. The Group considered that developmental aid must be grounded in a multidisciplinary analysis of the country's aid requirements undertaken with the help of natural and social scientists.

1.5. The Group recognized that aid given by the developed countries to the less developed countries is based on a mixture of motives. The long period of colonial rule, or semi-colonial status, under which many less developed countries have lived, makes the giving of aid a matter of justice, as well as being in the common interest, and humanitarian in nature. However, aid is often given to gain economic, political or strategic advantage, and the application of the principles enunciated below must be undertaken with full awareness of the motives operating in specific cases.

2. Principles

The Working Group considered the following principles as essential for successful aid by developed countries to the less developed ones.

2.1. Developmental aid should aim at the most rapid implementation of the newest advances in science and technology, applied in a flexible and imaginative way, so as to utilize fully the human and natural resources of the less developed countries for their economic progress. Self-reliance and capacity for independent growth must be the ultimate goals of aid. However, demagogic or narrow political considerations often result in the choice of programmes which, although they may return some benefits, do involve undue expenditure of local capabilities. Such programmes obviously should be discouraged, as should programmes that are chosen to advance personal interests or foster corruption. The developmental objectives of aid programmes should not be sacrificed to the short-term economic or political interests of either side. Furthermore, the economic relations of developing countries with less developed countries should be shaped to the fullest extent possible, to provide the maximum of assistance in development. For example, the value of aid can be largely

destroyed by instability of the price of basic commodities and raw materials.

One participant suggested that the developed countries should give priority to aid aimed at assistance to the public sector.

2. 2. Aid programmes involve mutual obligations. The best aid profits both donor and recipient to the maximum extent, with no interference in matters not directly related to the project. Aid should not be used (as it often is) for interfering in the affairs of the recipient to gain military or political advantage. Conversely, less developed countries should not use competition in aid to exert political pressure on the donor nations.

2. 3. The development of the less developed countries, made possible as well as necessary by the scientific revolution of our time, requires full utilization of creative capacities opened by this revolution. Active participation of the scientific communities in the planning and implementation of aid programmes is, therefore, needed (including in the term "science" both natural and social sciences, pure and applied). For this participation to be most effective, scientists should be given the greatest possible freedom of co-operation and discussion, on a national and international scale.

2. 4. To achieve the greatest efficiency of aid, greatly increased emphasis should be given to aid programmes based on international co-operation, particularly those within the United Nations system, and all possible co-ordination should be established between the bilateral programmes of different developed nations, and between bilateral and multilateral aid programmes.

2. 5. Development aid to be effective should not be a haphazard affair, but be based on an integrated plan. All aspects of national existence should be developed harmoniously; in particular, productive industry, agriculture, communications, education, health, government operations, and the creation of a properly organized scientific and technological community. Rational priorities should be established by the planning bodies, with the advice of scientific and technological councils, and aid should be scheduled and executed to ensure the appropriate phasing and completion of projects. Planning on a regional or even a continental basis will often be advantageous.

2. 6. The greatest possible continuity of aid programmes is needed, to minimize the wasted efforts which have affected so many programmes in the past. This means that both the developed and the less developed country should commit themselves at the outset to arrangements for continuing the project for a specified period of years, preferably long enough for the project to become self-sustaining.

2. 7. A realistic time-scale of development should be established in every developing nation, with proper scientific advice. It is essential that correlated progress be achieved in education, scientific facilities, and technological development, so as to achieve adequate staffing as well as full employment of all graduates. Aid programmes should be drawn up in the full realization that the transition from a traditional form of society to the modern technological

society involves far-reaching re-orientation of a culture. The best aspects of local cultures and of indigenous technology must be retained, and any tendency for the production of a standardized cultural pattern should be avoided.

3. Organization for Aid

The Working Group discussed the following changes in the organizational arrangements for giving and receiving aid, aimed at making these processes more effective.

3.1. Wherever possible, the international machinery of the U.N. family of organizations should be used to transmit aid. Every effort should be made to strengthen, broaden and co-ordinate the work of these agencies.

3.2. Support should be given to the efforts of the United Nations Economic and Social Council's Advisory Committee on the Application of Science and Technology to Development, to promote a world-wide programme of international co-operation in this field and make the machinery of the United Nations family of organizations itself function more effectively to help achieve the aims of that programme.

3.3. An effective co-operation of scientists from all parts of the world should be developed to keep aid mechanisms under review and to intensify the interest of the international community of scientists in the problems of the less developed countries.

3.4. Every effort should be made to co-ordinate the aid-giving activities of the developed nations. Each of the less developed countries should establish appropriate machinery for co-ordinating its requests for aid from all sources.

3.5. These requests for aid should be based on scientific surveys of the development requirements of the country. These plans should be prepared by a national planning authority, working in close collaboration with a national science advisory council.

3.6. The national scientific plan of a developing country must include the building up of scientific facilities needed for the implementation of the plan. To avoid waste of effort these facilities must be adequate to permit the effective use of foreign scientists requested under aid programmes. At the same time, good research schools must be developed to strengthen university science and to provide local employment opportunities for highly trained research workers.

3.7. In some areas, particularly in Africa, where there is an acute shortage of scientists, it may be possible and advantageous to establish planning bodies and scientific advisory councils on a regional or continental basis. This may ensure greater freedom, continuity and better utilization of scientists involved.

4. Implementation of Aid Programmes

In considering the carrying into effect of aid programmes and of the above proposals relating to organization of aid, the Working Group felt that the following points are of importance.

4.1. Establishing closer relationships

between a scientific institution (such as a university or research institute) in a developed country and an institution concerned with the same subject in a less developed country (often referred to as "twinning" or "co-operative links") could be profitable in implementing aid programmes. This would ensure continuity in advice and facilitate the provision of experts. Such twinning can be facilitated by undertaking work on complementary aspects of one research project, both partners making an original contribution to the programme.

4. 2. The efforts of U. N. E. S. C. O. to facilitate twinning on a mutually rewarding basis by establishing an information centre in this field are to be commended.

4. 3. There may be merit in having pairs of scientific institutions, one from the East and the other from the West, collaborate in servicing a scientific institution or programme in a less developed country. In some cases, pairs of experts from the East and West could collaborate in working on an agreed programme.

4. 4. The utmost care must be exercised in the selection of experts for work in less developed countries. It is important that they be personally and temperamentally suitable for the work, as well as being appropriately qualified. The less developed countries should accept a greater degree of responsibility for rejecting experts they do not consider suitable for their purposes, and should establish appropriate arrangements for examining candidates.

4. 5. Every attempt should be made to interest scientists in the developed countries in working, at least for a limited period, in developing countries. This would provide one way of relieving the considerable shortage of scientists available for work in less developed countries. Procedures should be elaborated to permit periods of such work without adverse effect on the scientist's career in his own country.

4. 6. The problem of proper communication between scientists and political leaders is a difficult and complex one requiring the active participation of both. Some useful mechanisms for two-way communication, in the form of scientific advisory councils, parliamentary committees, etc., have been developed in different countries, but their greater spread and further improvement is needed. At their best, such mechanisms not only facilitate the proper integration of scientific advice with planning but also involve scientists in collaborative efforts with political leaders in the difficult process of implementing aid proposals and developmental projects.

4. 7. Scientists in developed countries should try to use all available channels to help scientists in less developed countries to achieve a due role in the formulation of national development needs and implementation of aid programmes.

4. 8. International or regional bodies should act as independent referees in those cases where a country desires an evaluation of aid proposals.

4. 9. In fulfilment of the aim formulated in 2. 3, the Pugwash Continuing Committee should consider the possibility of providing further discussion of the problems of developmental aid, through working groups on this topic in forthcoming Pugwash Conferences, through the creation of a study group in this field, and through conferences devoted to this topic.

ABSTRACTS OF PAPERS PRESENTED AT THE 15th PUGWASH CONFERENCE IN ADDIS ABABA

I. Abu Sharr

OPTIMAL FORMS OF ORGANIZATION OF SCIENTIFIC RESEARCH

The many successful schemes of agricultural research in developing countries suggest that there is no one optimal form of organization, and one probably cannot be devised. At all levels of development the highest standards of reliability and accuracy must be required.

The organization of agricultural research programmes as part of national overall development programmes is to be fostered along with co-operation between related government departments and other institutions. This co-ordination of effort should lead increasingly to research projects directed towards the production problems of the country. Guarding against isolation must apply also to research workers within institutions.

Research staff may be best recruited among research-inclined new graduates, giving them in-service training and selecting the best for advanced training abroad. Personal qualities of the director and any foreign staff may be more important than is sometimes recognized.

In the initial stage of research, projects must be carefully chosen to make maximum use of limited resources. Early projects should be applied rather than basic, and must be of immediate application.

A successful agricultural research institute in a developing country can play a large role. Through proper project selection, good direction, and best use of staff, it can establish a position where it is able to comment on the feasibility of development ideas and plans submitted to it, and to recommend development projects to the planners. This approach will help achieve the integration of research in the development of the country as a whole.

W. K. Chagula

TRAINING OF SCIENTISTS AND TECHNICAL PERSONNEL IN DEVELOPING COUNTRIES

In the interest of continuity of essential services which are endangered after political independence, it is necessary to train indigenous personnel for the whole spectrum of posts requiring a scientific or technical background.

Ideally, the personnel should be

trained in institutions in their home countries or regions, which should be adequately staffed and equipped. Developed countries should assist in creating and developing these institutions so that, as soon as possible, they could be run efficiently by a majority of indigenous staff. However, the personnel for highly technical posts will continue to receive their postgraduate training or apprenticeships in developed countries. As developing countries become industrialized, more of this postgraduate training or apprenticeship should be done in developing countries. This applies also to personnel for universities and research institutes.

Training methods which have proved effective in developed countries should be tried first and re-evaluated before they are introduced in any developing country. In selecting expatriate teachers, it should be borne in mind that their effectiveness may not bear any relation to their paper qualifications.

The trained personnel should have regular refresher courses, and study tours arranged and financed with the assistance of developed countries where necessary.

Ideally, the majority of the teachers should be indigneous, although there should always be a few expatriate teachers carefully selected for their personal qualities as well as for their academic or professional qualifications. Generally, no expatriate teachers who have become prejudiced by serving in a former colonial government should be employed in training institutions in developing countries.

Finally, the policy makers in the training institutions of developing countries should ideally be nationals of those countries.

E. C. Childs

SCIENTIFIC AND TECHNOLOGICAL AID IN DEVELOPING COUNTRIES

The appeal to the expert is the appeal to authority. The expert is a man who has experience in one environment and is confident that he can recognize in another environment the circumstances that render his experience applicable.

The appeal to scientists is the appeal to a demonstrable sector of truth. This sector is small, and the scientist is more conscious of his ignorance than of his knowledge. He is rarely prepared to give unqualified advice. His proper function is to enlarge the body of knowledge upon which a particular sphere of action depends and against which specific proposals may be tested.

Scientifically established principles may be inadequate and appeal to authority inevitable in urgent cases. But the risks inherent in such appeal should be recognized, and even here the evidence of science may be valuable in estimating risk and deciding whether semi-blind advance is better or worse than no advance at all.

Panee Chiowanich

SCIENCE EDUCATION IN THAILAND

Development of science and technology in Thailand started before the Second World War with support from the Thai Government and various foreign and international organizations. Agriculture, medicine and engineering have received the greatest support with an aim to better the utilization of natural resources and the welfare of the people. However, the most important problem is the unsatisfactory method of teaching science at all levels. A summer programme for science teachers should be planned by the various government agencies concerned with science education, together with other international aid in providing trainees for this programme. The second problem is the increasingly large number of university students enrolled in science. The government decentralization programme also includes the expansion of science education and building of new universities and research institutes to serve the public demand. This results in the inadequate number of teaching staff who become more involved in teaching and administration with little or no time for research. The government budget has also been channelled toward adminstration and teaching activities. Since the decentralization programme is urgent and an increase in the number of science students is necessary, international aids may relieve the local government in the training of scientists by (a) offering fellowships for higher training in more developed countries; (b) supplying universities and research institutes with research facilities to encourage research; (c) financing an exchange programme of teaching staff between universities and research institutes, and with other countries; and (d) planning extensive, integrated international research programmes utilizing scientists and technicians from developing as well as developed countries.

J. Galtung

THE MANKIND 2000 PROJECT

In this paper the Mankind 2000 project, initiated by Robert Jungk, is outlined. It is an effort to mobilize creative thinking on an international and interdisciplinary scale to cope with some of the problems of long-term planning and thinking about Man's future in general. Man is faced with so many "revolutions" now that more should be done to hear from experts throughout the world their estimation of encouraging positive critical choice at the moment of decision.

A number of specific items of interest are mentioned, as well as some concrete projects where the idea of constructive, projective thinking may be implemented.

It is pointed out that future research and thinking is essential for everybody interested in peace problems, because

positive images of the future may contribute to peace by creating a desire and motivation to realize the images, because peace requires a long-term perspective as well as a short-term one, and because peace is not the only value in this world and, consequently, should be seen in a context of such values as equality, justice, abolition of exploitation, abolition of alienation, development, freedom from fear, freedom from want, freedom of action.

P. Gouin

THE CO-ORDINATION OF SCIENTIFIC RESEARCH IN DEVELOPING COUNTRIES

The need for scientific research in developing countries has been strongly stressed at the U. N. Conference on Science and Technology in Geneva 1964, and at the two African conferences at Lagos and Algiers in 1964. The co-ordination of research in these countries, where institutions for guiding scientific research, such as National Research Councils, Academies of Science, etc., are non-existent, is a difficult problem.

Considering that these countries have very low scientific manpower, insufficient basic research facilities, and very limited budgets, the efficiency of the scientists involved is impaired not only by the above-mentioned factors but also by the fact that, being very few, they are often asked to work on isolated missions with insufficient resources. To compensate somewhat for these shortcomings, it is strongly suggested that in the first stages of development the University should be the co-ordinating agent for scientific research. It is the only institution somewhat independent of political upheavals which could group the few scientists into effective teams, offer the basic substructures necessary for research, train and supervise scientific personnel, and ensure the continuity essential to success and to avoid duplication of efforts and expenditure.

H. Groot

UNIVERSITY RESEARCH IN LATIN AMERICA

In the first place, university research in Latin America is affected by factors which affect research in general, such as shortage of funds, a relative shortage of well-trained scientists in certain fields, a variable degree of political and administrative instability, and failure of governments to accept research as a matter of national concern with high priority and to recognize the development of science as an integrated and important part of the general development plans.

Within the university, the factors which affect research are mainly the lack of a well-rooted research tradition, frequently an outmoded and rigid curriculum, excessive number of students, part-time teaching, low salaries, and

occasionally a failure to recognize research as an integral part of effective teaching. Furthermore, the teaching in some universities, interested only in transmitting knowledge, does not foster attitudes basic to research, such as scientific curiosity and independent thinking. Frequently, the structure of the universities, an aggregate of isolated units under the same Rector, leads to unnecessary duplications, to ineffective use of money and impedes interdisciplinary teaching and research. Finally, there are institutions where the students participate actively in the governing of the university, a situation which occasionally leads to political interference of the student body.

Fortunately, the picture is changing, the traditions of research are becoming more firm and efforts to modernize the university system are observed throughout Latin America. The full-time regime is being adopted and there is an increased awareness that the improvement of university teaching will be achieved if research programmes are promoted and, conversely, that good teaching will stimulate research.

W. F. Gutteridge

THE EFFECT OF FOREIGN MILITARY AID ON THE SECURITY ARRANGEMENTS AND STABILITY OF AFRICAN STATES

The major powers have a clear responsibility to consider military aid to developing countries in terms of world stability and ultimate disarmament. The general development of these countries may also be served through military channels. The scale and type of equipment supplied are particularly important. Training assistance is more significant, but its consequences less predictable, than the provision of armaments. There is the possibility that it may affect the ultimate political role of the defence forces in a particular country, but generalizations on this are unlikely to be valid because of differing local conditions. For instance, British-trained armies have not conformed to a common pattern of political behaviour. There may, however, be problems for a developing country which makes use of a variety of military traditions, in that tensions can develop between officer groups. This, however, is a matter for local decision. What is not disputable is that the military will make a considerable contribution of technological and adminstrative experience and technical skill at all levels to emergent nations, and that control of force, of means of communication and transport will inevitably give them some power and influence. This may be seen as a direct result of foreign aid.

Helen Hughes

THE ECONOMICS OF INTEGRATED NATURAL RESOURCES AND INDUSTRIAL DEVELOPMENT IN SOUTH-EAST ASIA

Although the countries of South-East Asia are moderately well endowed with natural resources, their most valuable resources lie in their people, both as a potential work-force and as a market in an industrialized society. With some notable exceptions, industrialization in this region has to date been disappointingly slow, and this is to some extent at least due to inappropriate public policies. There has also been a tendency towards the creation of excess industrial capacity within some countries, and industry in many cases operates at a low level of efficiency. Transport and other communications within the area are poor, and plans for international co-operation in industrial growth seem premature. At present the greatest hope for effective international co-operation in the region seems to lie in the creation of regional research and educational institutes.

J. Kuczynski

FOOD RESOURCES AND POPULATION GROWTH

During the past 25 years, per capita productivity in agriculture in the developed countries has practically doubled. World production of agricultural produce per capita, on the other hand, has stagnated during this time and even declined in recent years. There is, therefore, a most serious contradiction between the possibility of utilizing machines and chemical products for a rapid abolition of hunger in the world and the actual decrease of food production per capita of the population.

World population is increasing at present faster than ever. There are estimates that between 1965 and 2000 the population will double. But it would be quite wrong to try to establish any objective connection between the growing hunger in the world and the population growth. The fertility of man increases much more slowly than the fertility of the soil.

At the same time, world population increases more than world crop harvests. This is due to a variety of causes: restriction of agricultural production in developed countries because of lack of effective purchasing power in the developing countries; failure of agrarian reform in many developing countries; too intense a concentration on industry and neglect of agriculture in some Socialist countries; insufficient attention to the needs of agriculture in the developing countries by international assistance and aid agencies, etc.

There is no reason why hunger cannot disappear in this world within a decade if the appropriate social, economic and technical measures are taken.

M. A. Lakany

DEVELOPMENT IN TRAINING AND INTERNATIONAL CO-OPERATION IN U. A. R.

The paper explains many of the revolutionary steps which have been undertaken during the last 10 - 12 years in training in science and technology in U. A. R. Some examples of what U. A. R. is gaining from international scientific co-operation, as well as of what it can do for the developing countries, are given. The following points, in the field of co-operation, are suggested:

1. Before building new institutes in any country of a region, we have to expand and mobilize the facilities of the already existing institutes to serve all the region.

2. Co-operation between developing countries of every region should be the basis for solving their problems.

3. In inviting experts, priority must be given to those from the same region before those from outside it.

4. International co-operation must include the abolishing of all scientific secrets.

I. Malecki

CONDITIONS OF WORK FOR SCHOLARS IN THE DEVELOPING COUNTRIES

What should be the position of young scientists in the community of each country? Some examples of careers of young men who are going to be devoted to scientific work are given. The social and living conditions, as well as the elements of scientific work in the research institutes, are analysed.

F. G. Nicholls

DEVELOPMENT OF SCIENTIFIC RESEARCH IN THAILAND

This paper is a case history study of problems encountered in building a central research organization in Thailand. Established by Act of Parliament, the Applied Scientific Research Corporation of Thailand has considerable freedom to manage its affairs and to choose its programme of work. Economic studies have been given an important role in planning research projects selected with practical objectives in view.

Manpower shortages, mainly in trained research personnel, have upset theoretical plans, and the availability of good salaries has not been enough to overcome this deficiency. Co-operative programmes have helped mobilize additional personnel and have been useful in breaking down barriers between potentially antagonistic groups. Particular attention has been given to co-operative work with universities.

Overseas contacts have provided mutual research leadership and much assistance in programme development. Special effort has gone into building up the scientific infra-structure needed for research.

Research activities have developed first in the industrial field, with particular attention being given to the utilization of agricultural products and other local materials.

Difficulties encountered in this operation are examined. They include the struggle to gain acceptance for a research body outside the civil service, ensuring that the considerable freedom granted by the Act is used effectively, and the evolution of adequate but not restrictive checks and balances in adminstrative system.

Norwegian Pugwash Group

EAST-WEST CO-OPERATION TO AID THE DEVELOPING COUNTRIES

The Norwegian Pugwash Group, referring to resolutions made at the 12th Pugwash Conference in Udaipur, India, proposes in this paper that technical assistance, especially in the field of qualified manpower assistance and whenever it is in the interests of the project and the developing nation, should be given on a basis of East-West co-operation. This co-operation should be not only on the level of governmental co-operation, but whenever possible in the field, thus promoting a pattern of co-operation rather than competition and bringing to the developing countries a wider range of thinking and experience from which they can pick in an eclectic way rather than having one school of thought brought to them. To implement this idea one might call on the governments of developing countries to ask for assistance in co-operation rather than competition, on governments of developed countries and U. N. agencies to facilitate the recruitment of experts in pairs, one from East and one from West, and on the experts themselves to look for counterparts with whom they could carry out such jobs together.

I. Paz

CONSIDERATIONS ON TECHNICAL PLANNING AND SCIENTIFIC-TECHNOLOGICAL CO-OPERATION POSSIBILITIES BETWEEN EAST AFRICAN COUNTRIES

In this paper a proposal is submitted intended to create a favourable atmosphere for industrial capital investments in East African countries. Some points concerning policies of instrumentation buying and standardization

are raised, and some possibilities of scientific and technological co-operation between East African universities are investigated.

In order to make investment prospects more attractive for small and medium-size investors, and enable them to provide the fermentative developmental pressure from below, the setting up of an Internation Insurance Organization is suggested.

This organization will work on a pure business-like basis, will be initiated in, and limited to, developing countries alone, and will ensure the investors against any changes of initial conditions of the investment as agreed upon. This will free the developing countries from the need of bilateral political agreements with developed countries for this purpose.

East African countries will for a long time to come be buyers, as far as heavy and sophisticated instrumentation is concerned. A more scientific approach in fixing the buying policies is therefore needed. Regional standardization committees will also be set up as a first step towards regional technological scientific co-operation. This, among many other obvious advantages, will also decrease the diversification of the market, increasing its single-element type of consumption and, through this, engage large-scale manufacturers in serious competition.

Regional co-operation between universities, having the same language of instruction in the adaptation and matching of curricula, in the interchange of teaching and scientific personnel, and for a more rational distribution of efforts in the acquisition of expensive instrumentation among countries involved, is highly desirable and recommended.

Y. Peter

QUESTIONS OF WATER DEVELOPMENT

1. Water is becoming scarce all over the world, and the developing countries should learn from mistakes made in previous times and try to make judicious short-cuts towards its proper use.

2. Health aspects require that populations living in small rural centres get priority regarding their water needs. Modern collection of the source, brought by gravity or pumped to a properly situated storage reservoir, and distribution by public stand pipes, should be achieved. These village schemes should be designed, operated and supervised by the Government Public Works Department.

3. Operation and maintenance of existing major installations have to be safeguarded by administrative means and necessary legislation. Plans for extension should be made in time and the necessary budget ensured. The budget of a Water Department of a Municipality should be kept strictly separate, and the water price calculated to cover, besides actual operational cost, a sufficient sum for the sinking fund, renewal and maintenance. The distribution system may show some difference compared with the one used in more developed countries. It is necessary to develop plans for sewage treatment and disposal parallel with those for the water supply.

4. Special problems of different water quality for different purposes, concentrated demands, intermediate treatment and re-use, and ultimate discharge of trade wastes need studying.

5. Stages of development influence the choice of the source.

6. If the primitive demands of an only supply-covering agriculture system become insufficient, and are abandoned in favour of more promising industrial crops, irrigation will be needed.

7. Each non-consumptive use has to be planned in such a way as not to interfere with and prevent subsequent consumptive use.

8. Where water occurs as a damaging factor, regulation and drainage will always ultimately prove to be an economical benefit.

9. The co-ordination of all uses, the setting of priorities, the investigation and selection of alternative solutions, will justify in each country a special agency for water development alone. This agency should also be entrusted with the forming of a water policy suitable to the country and the formulating of special water legislation. Water should be used only for certified purposes, in known quantities, and at an approved price.

10. Track should be kept of all related fields and scientific development. The training of the necessary personnel in sufficient numbers, at the different levels required, should be carefully studied.

J. L. Quirino

SCIENCE IN DEVELOPING COUNTRIES: THE PRIORITIES AND MISTAKES

In the relationships of the developed to the developing countries in the field of aid, there is a recognized but ill-defined element of distortion, resulting from complexes of greatness and smallness in the two groups. To find

a solution, this distortion factor needs to be enunciated, but it is usually avoided.

The developing countries which previously were able to follow a policy exclusively inspired by their own civilization are now progressing towards imbalance, due, consciously or not, to having been impressed with the economic and political methods of Europe. This is an interim situation, and during it the developed countries are bound to suggest the order of priorities in aid which they judge suitable for helping a country.

In contrast to this, the planning of science will only be efficient and profitable if it is wholly conceived and established by those who are to benefit from it.

For a country to achieve social and economic development, it must feel that this is due to its own efforts. On the national level, the necessity for industrialization must be recognized to take the developing country out of the beggar's situation. Concomitant with this, there must be a programme of education so that all will have that minimum culture at their disposal in order to give birth to, and then provide the framework of the new civilization which must be theirs in the next two or three generations.

F. G. Torto

DEVELOPMENT OF POSTGRADUATE RESEARCH IN UNIVERSITY SCIENCE DEPARTMENTS

The promotion in a developing country of university postgraduate research, in spite of limited national resources and of the existence of an independent research organization, can contribute to technological development. Thus, it favours the recruitment and retention of university staff. Its influence on undergraduate and postgraduate teaching contributes to good science teaching in schools and to efficient and productive practice in industry, research and scientific services. Local training of research workers promotes the development of adaptability as well as the emergence of true universities.

Shortage of funds may be alleviated if governments accept the value of research and if political and other factors in aid for developing countries are removed by channelling through international agencies. The shortage of supporting technical personnel may be mitigated by governments of developed countries offering scholarships for technician training rather than for university courses, for which adequate facilities often exist. Regional or international co-operation in technician training may usefully be explored.

A shortage of research students, a common difficulty, may be met by encouragement of young persons from advanced countries to go and work for limited periods as research students and assistants in the developing countries.

D. P. S. Wasawo

EDUCATION AND DEVELOPMENT OF THE ACADEMIC SPIRIT IN EAST AFRICA

1. While our most immediate and pressing problems are those concerned with ignorance, poverty and disease, the effective solution to them depends largely on an analytical, followed by a synthetic, approach; in other words, on the attitude taken to them.

2. A totally acquisitive attitude towards knowledge, without question and without reflection, is a line which is easy to take, but which is, in the last analysis, barren, incapable of generating new ideas or providing solutions to practical problems.

3. Alternatively, in order to obtain quick and lasting solutions to our problems, it is necessary to develop at all levels a reflective, investigative and experimentally oriented attitude - an academic spirit. At the same time it is important to create a free and healthy atmosphere, particularly in the University where these attitudes can thrive.

4. It is difficult to pose the right kind of questions or to fit imported ideas into a local framework without such an approach. These sorts of exercises are basic to a realistic approach to development.

5. In order to appreciate fully the magnitude of the problem, it is necessary to draw attention to the following:

(a) the approach to tribal education was authoritarian and this tradition dies hard;

(b) our first contact with European-type education was largely through missionaries whose central pre-occupation was the Bible. Approach to Bible teaching, as everyone knows, is authoritarian;

(c) education in a colonial set-up was geared mainly to perpetuating colonialism, and certainly did not actively promote the development of the academic spirit.

6. It is important that the development of the academic spirit should be an exercise carried out right from the beginning of a child's education by, for example, being introduced to the elements of his environment, and carried on as a sustained and carefully thought out programme throughout his school and University education.

7. To do this effectively, the teacher training programme should be imaginative, and arrangements should be made for refresher courses. At the same time, adequate provision should be made for material tools with which to inculcate the academic spirit.

8. Within the University it is important that local models and examples be used in the teaching of undergraduates. Students should know how knowledge has come about and in which areas the frontiers are being extended. An important part of the emphasis should be on learning how to learn.

B. Winid

THE DISTRIBUTION OF TOWNS IN DEVELOPING COUNTRIES

The African countries have inherited from the previous colonial powers a distribution network of towns which was adjusted to the need of their political and economic structure and also for domestic and international security. The urbanization in developing countries cannot follow the European way because:

(a) in Africa today we are developing mainly highways and automobile communications, instead of railways and waterways;

(b) the modern structure creates a great number of social, political, cultural and economic institutions and services which are mostly socialized and planned establishments;

(c) these institutions need better and modern municipality services which must be greater if they are to work economically;

(d) the small subsistence farmer enters the cash economy with the merchant coming to the producer;

(e) the industrial enterprises are planned and built, taking at once the capacity of regional resources and productions, mostly with the help of some government;

(f) the international boundaries in Africa were not established after long military struggles and the integrations of ideology make it possible to build boundary towns serving both countries;

(g) towns are the axis for building the administration pattern, which is changing, adjusting to the need of the independent country.

In working out the future distribution pattern of towns, all branches of social, natural and technical sciences must be involved, and experience from other parts of the world taken into consideration.

H. J. BHABHA

Professor Homi J. Bhabha was killed in an air crash on 24th January, 1966, during a flight to Geneva.

Bhabha was a scientist of great renown, and he was well known to Pugwash members. He participated in the Third Pugwash Conference, and was a member of the Indian Organizing Committee which prepared the 12th Conference in Udaipur in January, 1964. As Chairman of the Indian Atomic Energy Commission, he was host to the participants of the Conference.

Bhabha played a very important role in shaping India's policy in problems concerned with the peaceful and military applications of atomic energy. His tragic death is a great loss to India, to science, as well as to those who seek a peaceful solution to the problems which have arisen from the progress of science.

PUGWASH EVENTS

CONTINUING COMMITTEE

Meetings of the Continuing Committee were held at the CIBA Foundation, London, on 30th and 31st August, 1965, and at Africa Hall, Addis Ababa, on 27th and 28th December, 1965 and 4th January, 1966. The meetings were mainly concerned with the detailed planning of the 15th Conference in Ethiopia and the 16th Conference in Sweden.

The Committee also discussed the problem of publishing statements at Conferences and the follow-up of proposals made at conferences or by study groups. Reports were received and discussed of various Pugwash and related activities.

At the last meeting on 4th January, the Committee decided to send cables to Chairman Kosygin, Prime Minister Shastri, and President Ayub Khan on the occasion of their meeting in Tashkent. Just before he died, Mr. Shastri sent a cable thanking the Continuing Committee for its message and assuring them that every effort was being made to reach a satisfactory solution.

16th PUGWASH CONFERENCE: SOPOT, 11th - 16th SEPTEMBER, 1966

The 16th Pugwash Conference will be held in Sopot, Poland, from 11th to 16th September, 1966. Sopot is on the Baltic coast, and the participants will be accommodated in the Grand Hotel, where the meetings will also take place. The main Conference will be preceded by a preliminary meeting on 9th and 10th September in Jablonna, near Warsaw.

The theme of the Conference will be "Disarmament and World Security, especially in Europe", and the programme will be divided into four Working Groups with the following topics:

1. Disarmament in Europe.

2. Reduction of tensions and political settlements in Europe.

3. Main problems of progress towards G. C. D.

4. Measures for arms limitation.

Some 80 participants are being invited, with the following approximate geographical distribution: 10 each from the U. S. S. R. and U. S. A.; 5 each from Poland and the U. K.; 4 from France; 3 each from Czechoslovakia, F. G. R., G. D. R. and Sweden; 2 each from Belgium, Bulgaria, Denmark, Holland, Hungary, India, Italy, Norway, Rumania and Yugoslavia; one each from Australia, Austria, Brazil, Canada, Ethiopia, Finland, Greece, Ireland, Israel, Japan, Pakistan, Spain, Switzerland, Turkey and U. A. R.

The Conference is sponsored by the Polish Academy of Sciences.

17th PUGWASH CONFERENCE: STOCKHOLM, SEPTEMBER, 1967

The 17th Pugwash Conference is to take place in Stockholm, Sweden, in the second week of September, 1967. The meetings will probably be held in the Houses of Parliament. This will be a large conference, of the same type and programme as the 10th Conference in London in 1962. All participants in any of the past 16 conferences will be invited. The programme of the Conference will, among other topics, be concerned with the organization and future activities of Pugwash.

STUDY GROUP ON EUROPEAN SECURITY

On the initiative of the Pugwash Groups in Czechoslovakia and Denmark, a Pugwash Study Group on European Security was set up. The first constituting meeting was held in Prague on 13th - 15th December, 1965, with the following participants: V. Hajdu, L. Liska, T. Nemec, A. Snejdarek and V. Sojak (Czechoslovakia); D. J. Adler and J. Wilhjelm (Denmark); P. Valkenburgh (The Netherlands); A. Klafkowski and K. D. Lapter (Poland); R. Björnerstedt and A. Sparring (Sweden).

It was decided that the Study Group should have the following principal tasks:

1. To initiate studies on questions of European Security in the participating countries, and to promote international collaboration among the research institutions and groups involved.

2. To prepare a report to the forthcoming 16th Pugwash Conference in Poland in September, 1966.

The co-Chairmen of the Study Group are Dr. A. Snejdarek and Dr. D. J. Adler, and the members will be scientists from the following countries: Austria, Belgium, Czechoslovakia, Denmark, Federal German Republic, German Democratic Republic, Hungary, The Netherlands, Norway, Poland, Sweden and Yugoslavia.

The Study Group is to arrange a series of meetings for the purpose of reviewing papers, comments and suggestions to be forwarded by members of the Group, and to organize seminars on specific topics.

The next meeting of the Group is scheduled for 2nd - 5th March in Copenhagen.

STUDY GROUP ON BIOLOGICAL WARFARE

Following the statement on biological warfare of the Venice Conference, a meeting of the Study Group was held in Stockholm on 22nd and 23rd October, 1965. The following took part:

F. Mainx (Austria); M. J. Sterzl (Czechoslovakia); O. Maaløe (Denmark); K. D. Lapter (Poland); J. H. Humphrey, P. J. Lindop and J. Rotblat (U.K.); R. Björnerstedt, M. Fehrm, S. Gard,

C. -G. Heden, L. E. Tammelin and A. Tiselius (Sweden); M. Kaplan and M. Meselson (U. S. A.). There was also an observer from the Western European Union.

The meeting issued the following communique:

"A special study group on biological warfare has met at the Wenner-Gren Centre, Stockholm (October 22nd and 23rd) in continuation of a series of meetings held previously under the auspices of the Pugwash Continuing Committee. The meeting affirmed that continued research and development of biological weapons will result in compounding the difficulties in achieving general and complete disarmament. The continued development of such weapons and their introduction into the arsenals of nations would have a seriously destabilizing effect by increasing the number of nations possessing major mass destructive capabilities. The Group considered that means are still available for preventing such a development. One of the principal means is the reduction of secrecy and the encouragement of international collaboration and exchange in biology and public health. From the technical point of view it may be feasible to detect and control the development of major biological warfare capabilities, but much research is required to arrive at an effective control system. Extensive consideration was given to problems of the appropriate design of an inspection and verification system. The possibilities to establish an international study were discussed and specific recommendations were made with this aim in mind."

The Swedish Pugwash Committee was entrusted with carrying out the decisions of the meeting. Dr. Heden will be responsible for the organization of the Voluntary Inspection Scheme, and Dr. Björnerstedt for the convening in the near future of a meeting of experts to discuss rapid detection methods.

UNIVERSITIES AND THE QUEST FOR PEACE

A meeting of scholars from 15 countries was held in Rome on 5th - 7th December, 1965, to discuss the means of making the universities more conscious of their responsibilities for achieving international understanding and peace. The participants included Dr. Luther H. Evans (U. S. A.), the former Director-General of UNESCO; Dr. I. G. Petrowskii (U. S. S. R.), Rector of the University of Moscow; and Dr. Ugo Papi (Italy), Rector of the University of Rome. Professor J. Rotblat attended on behalf of the Pugwash Continuing Committee.

The meeting decided to call a World Conference of some 500 university representatives, as well as of a number of educational experts. The Conference is to be held at the University of Rome in late August or early September, 1967.

The Pugwash Continuing Committee welcomed this initiative, and decided to give it its support and encouragement.

THE CONTINUING COMMITTEE OF THE PUGWASH CONFERENCES ON SCIENCE AND WORLD AFFAIRS

Chairman:	Lord Russell
Secretary-General:	Prof. J. Rotblat
Members:	
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