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The Early History of The Pugwash Movement  
by  
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The Pugwash Movement, as it is called, consists of periodical conferences of scientists from Eastern and Western and neutral countries intended to discuss in a scientific, non-polemical spirit various problems arising out of modern methods of mass destruction. It came from a projected collaboration between Einstein and myself on the dangers connected with nuclear warfare. Unfortunately, Einstein was suffering from his last, fatal illness and, while still willing to collaborate, was unable to join in the work of drafting the appeal that we had in mind. He therefore left it to me to draw up a manifesto to which I sought signatures of a limited number of very eminent men of science. This manifesto was as follows:

"In the tragic situation which confronts humanity, we feel that scientists should assemble in conference to appraise the perils that have arisen as a result of the development of weapons of mass destruction, and to discuss a resolution in the spirit of the appended draft.

"We are speaking on this occasion, not as members of this or that nation, continent, or creed, but as human beings, members of the species Man, whose continued existence is in doubt. The world is full of conflicts; and, over-shadowing all minor conflicts, the titanic struggle between Communism and anti-Communism.

"Almost everybody who is politically conscious has strong feelings about one or more of these issues; but we want you, if you can, to set aside such feelings and consider yourselves only as members of a biological species which has had a remarkable history, and whose disappearance none of us can desire.

"We shall try to say no single word which should appeal to one group rather than to another. All, equally, are in peril, and, if the peril is understood, there is hope that they may collectively avert it.

"We have to learn to think in a new way. We have to learn to ask ourselves, not what steps can be taken to give military victory to whatever group we prefer, for there no longer are such steps; the question we have to ask ourselves is: what steps can be taken to prevent a military contest of which the issue must be disastrous to all parties?

"The general public, and even many men in positions of authority, have not realized what would be involved in a war with nuclear bombs. The general public still thinks in terms of the obliteration of cities. It is understood that the new bombs are more powerful than the old, and that, while one A-bomb could obliterate Hiroshima, one H-bomb could obliterate the largest cities, such as London, New York, and Moscow.

"No doubt in an H-bomb war great cities would be obliterated. But this is one of the minor disasters that would have to be faced. If everybody in London, New York, and Moscow were exterminated the world might, in the course of a few centuries, recover from the blow. But we now know, especially since the Bikini test, that nuclear bombs can gradually spread destruction over a very much wider area than had been supposed.

"It is stated on very good authority that a bomb can now be manufactured which will be 2,500 times as powerful as that which destroyed Hiroshima. Such a bomb, if exploded near the ground or under water, sends radio-active particles into the upper air. They sink gradually and reach the surface of the earth in the form of a deadly dust or rain. It was this dust which infected the Japanese fishermen and their catch of fish.

"No one knows how widely such lethal radio-active particles might be diffused, but the best authorities are unanimous in saying that a war with H-bombs might quite possibly put an end to the human race. It is feared that if many H-bombs are used there will be universal death - sudden only for a minority, but for the majority a slow torture of disease and disintegration.

"Many warnings have been uttered by eminent men of science and by authorities in military strategy. None of them will say that the worse results are certain. What they do say is that these results are possible, and no one can be sure that they will not be realized. We have not yet found that the views of experts on this question depend in any degree upon their politics or prejudices. They depend only, so far as our researches have revealed, upon the extent of the particular expert's knowledge. We have found that the men who know most are the most gloomy.

"Here, then, is the problem which we present to you, stark and dreadful and inescapable: Shall we put an end to the human race; or shall mankind renounce war?"\*  
People will not face this alternative because it is so difficult to abolish war.

"The abolition of war will demand distasteful limitations of national sovereignty.\*\* But what perhaps impedes understanding of the situation more than any-

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\*"Professor Joliot-Curie wishes to add the words: 'as a means of settling differences between States'."

\*\*"Professor Joliot-Curie wishes to add that these limitations are to be agreed by all and in the interests of all."

thing else is that the term 'mankind' feels vague and abstract. People scarcely realize in imagination that the danger is to themselves and their children and their grandchildren, and not only to a dimly apprehended humanity. They can scarcely bring themselves to grasp that they, individually, and those whom they love are in imminent danger of perishing agonizingly. And so they hope that perhaps war may be allowed to continue provided modern weapons are prohibited.

"This hope is illusory. Whatever agreements not to use H-bombs had been reached in time of peace, they would no longer be considered binding in time of war, and both sides would set to work to manufacture H-bombs as soon as war broke out, for if one side manufactured the bombs and the other did not, the side that manufactured them would inevitably be victorious.

"Although an agreement to renounce nuclear weapons as part of a general reduction of armaments\*\*\* would not afford an ultimate solution, it would serve certain important purposes. First: any agreement between East and West is to the good in so far as it tends to diminish tension. Second: the abolition of thermo-nuclear weapons, if each side believed that the other side had carried it out sincerely, would lessen the fear of a sudden attack in the style of Pearl Harbour, which at present keeps both sides in a state of nervous apprehension. We should, therefore, welcome such an agreement, though only as a first step.

"Most of us are not neutral in feeling, but, as human beings, we have to remember that, if the issues between East and West are to be decided in any manner that can give any possible satisfaction to anybody, whether Communist or anti-Communist, whether Asian or European or American, whether White or Black, then

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\*\*\* "Professor Muller makes the reservation that this be taken to mean 'a concomitant reduction of all armaments'."

these issues must not be decided by war. We should wish this to be understood, both in the East and in the West.

"There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal, as human beings, to human beings: Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot, there lies before you the risk of universal death.

"Resolution"

"We invite this Congress, and through it the scientists of the world and the general public to subscribe to the following resolution:

" ' In view of the fact that in any future world war nuclear weapons will certainly be employed, and that such weapons threaten the continued existence of mankind, we urge the Governments of the world to realize, and to acknowledge publicly, that their purpose cannot be furthered by a world war, and we urge them, consequently, to find peaceful means for the settlement of all matters of dispute between them. ' "

Einstein's signature to this manifesto was the last public act of his life. The other signatories were:

Professor Max Born (Professor of Theoretical Physics at Berlin, Frankfort, and Gottingen, and of Natural Philosophy, Edinburgh; Nobel Prize in physics).

Professor P. W. Bridgman (Professor Physics, Harvard University; Nobel Prize in Physics).

(Professor of Theoretical Physics, University of Warsaw).

Professor J. F. Joliot-Curie (Professor of Physics at the College de France; Nobel Prize in chemistry).

Professor H. J. Muller (Professor of Zoology at University of Indiana; Nobel Prize in physiology and medicine).

Professor Linus Pauling (Professor of Chemistry, California Institute of Technology; Nobel Prize in chemistry).

Professor C. F. Powell (Professor of Physics, Bristol University; Nobel Prize in physics).

Professor J. Rotblat (Professor of Physics, University of London; Medical College of St. Bartholomew's Hospital).

Bertrand Russell.

Professor Hideki Yukawa (Professor of Theoretical Physics, Kyoto University; Nobel Prize in Physics).

This manifesto was published to the world at a Press Conference in London on July 9, 1955. Its purpose was to bring together men of science of the most divergent political opinions - Communist, anti-Communist and neutral - in a friendly atmosphere in which it was hoped that a scientific spirit would enable them to find a greater measure of agreement than the politicians had found possible. The Press Conference was attended by an enormous number of journalists and T.V. and wireless men from every part of the world. Professor Rotblat was brave enough to take the Chair in spite of the fact that the bringing together of East and West was thought rash by many people. I read the manifesto and spent more than two hours answering questions. In the main the reception of the manifesto by the assembled journalists was surpris-

ingly friendly. There were of course, difficulties in obtaining general support for the manifesto. There were those among the public of the West who regarded any effort to avoid nuclear war and any friendly contact with Communists as Communist-inspired and, therefore, undesirable. There were also those who regarded all scientists as wicked, since it was their discoveries and inventions that caused the trouble. It was not, however, among men of science that such opinions prevailed, and from them the manifesto met with a very wide, favourable reception.

The organization of the first conference in response to the manifesto was by no means easy. The greatest difficulty was finance. Wherever the congress might be held, most of the participants would have to make long journeys which few of them could afford. This difficulty was solved by the generosity of Mr. Cyrus Eaton who offered to pay all expenses and to house the conference at his estate in Pugwash, Nova Scotia provided that it took the name of the Pugwash Conference or Movement.

This first conference (July 7-10, 1957) as compared to was not very large. There were twenty-two participants: fifteen physicists; two chemists; four biologists; and a lawyer. Of these participants, seven were from the U.S.A., three from the U.S.S.R., three from Japan; three from Great Britain; three from Canada; and one each from Australia, Austria, China, France and Poland. The organizing work, which was very considerable, was undertaken by Professors Rotblat, Burhop, and Powell. The Conference, as well as all subsequent conferences of the Pugwash Movement, differed from more formal conferences in the fact that the participants, while the conference lasted, all lived together and saw each other socially and informally in addition to at the more formal meetings. This made a friendly atmosphere much easier to preserve, and the participants came to regard each other as

friendly human beings who could be understood, even liked, not as antagonists from a foreign and possibly inimical nation. In consequence, it was found that a surprisingly large measure of agreement was possible. The work of the conference was divided among three committees: the first, on radiation hazards; the second, on the control of nuclear weapons; and the third, on the social responsibility of scientists. Each committee drew up a report, and the conference as a whole issued a report saying, inter alia:

"Men of science are now well aware that the fruits of their labours are of paramount importance to the future of mankind, and they are thus compelled to consider the political implications of their work. Their opinions on politics are as diverse as those of other men. These facts make it difficult for a conference such as the present to issue an agreed statement on matters which are controversial. The discussion of such issues, however, allowed the points of difference and the areas of agreement to be defined, and led to a measure of mutual understanding of the opinions of one another...."

"The estimates of the hazards which have arisen from test explosions, permitted a closer examination to be made of the probable consequences of an unrestricted nuclear war. This examination led to the unquestioned conclusion that a general war with nuclear weapons would indeed represent a disaster of unprecedented magnitude. The radiological hazards would be thousands of times greater than those due to the fall-out effects of test explosions. In the combatant countries, hundreds of millions of people would be killed outright by the blast and heat, and by the ionizing radiation produced at the instant of explosion whether bombs of the so-called 'clean' or 'dirty' kind were employed. If 'dirty' bombs were used, large

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areas would be made uninhabitable for extended periods of time, and additional hundreds of millions of people would die from delayed effects of radiation from local fall-out, some in the exposed population from direct radiation injury, and some in succeeding generations as a result of genetic effects. But even countries not directly hit by bombs would suffer through global fall-out, which, under certain conditions, might be of such intensity as to cause large-scale genetic and other injury....

"Finally, we should like to give expression to the high degree of unanimity we have found among all the members of the Conference on fundamental aims. We are all convinced that mankind must abolish war or suffer catastrophe; that the dilemma of opposing power groups and the arms race must be broken; and that the establishment of lasting peace will mark the opening of a new and triumphant epoch for the whole of mankind. We earnestly hope that our conference may make a modest contribution to these great aims."

This report was signed by all the participants except John Foster of Canada and Leo Szilard.

The first conference appointed a "Continuing Committee" to organize future conferences and undertake whatever additional work might be necessary. The members of this Continuing Committee were Professors Rotblat, Powell, Rabinowitch, Academician Skobeltzyn and myself. The chief importance of the conference, from the point of view of the general public, consisted in the demonstration that men of science of the most diverse political opinions could agree on a large number of the most important questions connected with current political controversies. The impact in the West, however, was less than might have been hoped since organs of pub-

licity find agreement less newsworthy than disagreement. But gradually what one might call the Pugwash point of view has come to be increasingly favoured among those who know enough to have a competent opinion. Subsequent conferences have been much more widely attended and somewhat better publicized - though never as fully as they should have been. The friendly cooperation between men of different nationalities and different political opinions has continued to be maintained.

The Second Pugwash Conference took place at Lac Beauport in Canada in March and April, 1958. Mr. Eaton again provided accommodation and paid expenses, but, owing to the northern prolongation of winter, the conference could not be held in Nova Scotia. The discussions of the conference were announced at being concerned with "the dangers of the present situation, and ways and means of diminishing them. At its conclusion, a statement was issued.

A third and larger Conference was planned to take place in Austria. It was held in September, 1958, partly at Kitzbuhel in the Tyrol, and partly in Vienna where it obtained the support of the Austrian Government. It issued a document which was called "The Vienna Declaration" which states more fully and adequately than any previous pronouncement the aims as to which the Pugwash Conferences are agreed. This Declaration was accepted nem. con., Leo Szilard being the only one to abstain. A hundred and one persons were present, of whom, however, only seventy were participating scientists, the others being observers or guests. The Vienna Declaration, in view of the fact that it was supported by scientists of East and West and of neutral countries, is a very important document. I think one may say, without exaggeration, that it proves that, if scientists had the power to decide world problems, the nuclear peril would soon be under control. The Declaration

is as follows:

"1. Necessity to End Wars

"We meet in Kitzbuhel and in Vienna at a time when it has become evident that the development of nuclear weapons makes it possible for man to destroy civilization and, indeed, himself; the means of destruction are being made ever more efficient. The scientists attending our meetings have long been concerned with this development, and they are unanimous in the opinion that a full-scale nuclear war would be a world-wide catastrophe of unprecedented magnitude.

"In our opinion defense against nuclear attack is very difficult. Unfounded faith in defensive measures may even contribute to an outbreak of war.

"Although the nations may agree to eliminate nuclear weapons and other weapons of mass destruction from the arsenals of the world, the knowledge of how to produce such weapons can never be destroyed. They remain for all time a potential threat for mankind. In any future major war, each belligerent state will feel not only free but compelled to undertake immediate production of nuclear weapons; for no state, when at war, can be sure that such steps are not being taken by the enemy. We believe that, in such a situation, a major industrial power would require less than one year to begin accumulating atomic weapons. From then on, the only restraint against their employment in war would be agreements not to use them, which were concluded in times of peace. The decisive power of nuclear weapons, however, would make the temptation to use them almost irresistible, particularly to leaders who are facing defeat. It appears, therefore, that atomic weapons are likely to be employed in any future major war with all their terrible consequences.

"It is sometimes suggested that localized wars, with limited objectives, might still be fought without catastrophic consequences. History shows, however, that the risk of local conflicts growing into major wars is too great to be acceptable in the age of weapons of mass destruction. Mankind must, therefore, set itself the task of eliminating all wars, including local wars.

"2. Requirements for Ending the Arms Race

"The armaments race is the result of distrust between states; it also contributes to this distrust. Any step that mitigates the arms race, and leads to even small reductions in armaments and armed forces, on an equitable basis and subject to necessary control, is therefore desirable. We welcome all steps in this direction and, in particular, the recent agreement in Geneva between representatives of East and West about the feasibility of detecting test-explosions. As scientists, we take particular pleasure in the fact that this unanimous agreement, the first after a long series of unsuccessful international disarmament negotiations, was made possible by mutual understanding and a common objective approach by scientists from different countries. We note with satisfaction that the governments of the U.S.A., U.S.S.R., and U.K. have approved the statements and the conclusion contained in the report of the technical experts. This is a significant success; we most earnestly hope that this approval will soon be followed by an international agreement leading to the cessation of all nuclear weapon tests and an effective system of control. This would be a first step toward the relaxation of international tension and the end of the arms race.

"It is generally agreed that any agreement on disarmament, and in particular nuclear disarmament, requires measures of control to protect every party from possible evasion. Through their technical competence, scientists are well aware

that effective control will in some cases be relatively easy, while it is very difficult in others. For example, the conference of experts in Geneva has agreed that the cessation of bomb tests could be monitored by a suitable network of detecting stations. On the other hand, it will be a technical problem of great difficulty to account fully for existing stocks of nuclear weapons and other means of mass destruction. An agreement to cease production of nuclear weapons presents a problem of intermediate technical difficulty between these two extreme examples.

"We recognize that the accumulation of large stocks of nuclear weapons has made a completely reliable system of controls for far-reaching nuclear disarmament extremely difficult, perhaps impossible. For this disarmament to become possible, nations may have to depend, in addition to a practical degree of technical verification, on a combination of political agreements, of successful international security arrangements, and of experience of successful cooperation in various areas. Together, these can create the climate of mutual trust, which does not now exist, and an assurance that nations recognize the mutual political advantages of avoiding suspicion.

"Recognizing the difficulties of the technological situation, scientists feel an obligation to impress on their peoples and on their governments the need for policies which will encourage international trust and reduce mutual apprehension. Mutual apprehensions cannot be reduced by assertions of good will; their reduction will require political adjustment and the establishment of active cooperation.

### "3. What War Would Mean

"Our conclusions about the possible consequences of war have been supported by reports and papers submitted to our Conference. These documents indicate that if, in a future war, a substantial proportion of the nuclear weapons already manu-

factured were delivered against urban targets, most centers of civilization in the belligerent countries would be totally destroyed, and most of their populations killed. This would be true whether the bombs used derived most of their power from fusion reactions (so-called 'clean' bombs) or principally from fission reactions (so-called 'dirty' bombs). In addition to destroying major centers of population and industry, such bombs would also wreck the economy of the country attacked, through the destruction of vital means of distribution and communication.

"Major states have already accumulated large stocks of 'dirty' nuclear weapons; it appears that they are continuing to do so. From a strictly military point of view, dirty bombs have advantages in some situations; this makes likely their use in a major war.

"The local fall-out resulting from extensive use of 'dirty' bombs would cause the death of a large part of the population in the country attacked. Following their explosion in large numbers (each explosion equivalent to that of millions of tons of ordinary chemical explosive), radioactive fall-out would be distributed, not only over the territory to which they were delivered but, in varying intensity, over the rest of the earth's surface. Many millions of deaths would thus be produced, not only in belligerent but also in non-belligerent countries, by the acute effects of radiation.

There would be, further, substantial long-term radiation damage, to human and other organisms everywhere, from somatic effects such as leukemia, bone cancer, and shortening of the life span; and from genetic damage affecting the hereditary traits transmitted to the progeny.

"Knowledge of human genetics is not yet sufficient to allow precise predictions of consequences likely to arise from the considerable increase in the rate of mutation which would ensue from unrestricted nuclear war. However, geneticists believe that they may well be serious for the future of a surviving world population.

"It is sometimes suggested that in a future war, the use of nuclear weapons might be restricted to objectives such as military bases, troop concentrations, air fields, and other communication centers; and that attacks on large centers of population could thus be avoided.

"Even tactical weapons now have a large radius of action; cities and towns are commonly closely associated with centers of supply and transportation. We, therefore, believe that even a 'restricted' war would lead, despite attempted limitation of targets, to widespread devastation of the territory in which it took place, and to the destruction of much of its population. Further, an agreement not to use cities for military purposes, entered into in order to justify their immunity from attack, is unlikely to be maintained to the end of a war, particularly by the losing side. The latter would also be strongly tempted to use nuclear bombs against the population centers of the enemy, in the hope of breaking his will to continue the war.

#### "4" Hazards of Bomb Tests "

"At our first conference it had been agreed that while the biological hazards of bomb tests may be small compared with similar hazards to which mankind is exposed from other sources, hazards from tests exist and should receive close and continual study. Since then, an extensive investigation by the United Nations Scientific Committee on the Effects of Atomic Radiation has been carried out and its authoritative conclusions published. In this case, too, scientists from many

different countries have been able to arrive at a unanimous agreement. Their conclusions confirm that the bomb tests produce a definite hazard and that they will claim a significant number of victims in present and following generations. Though the magnitude of the genetic damage appears to be relatively small compared with that produced by natural causes, the incidence of leukemia and bone cancer due to the radio-activity from test explosions may, in the estimate of the UN committee, add significantly to the natural incidence of these diseases. This conclusion depends on the assumption (not shared by all authorities in the field) that these effects can be produced even by the smallest amount of radiation. This uncertainty calls for extensive study and, in the meantime, for a prudent acceptance of the most pessimistic assumption. It lends emphasis to the generally agreed conclusion that all unnecessary exposure of mankind to radiation is undesirable and should be avoided.

"It goes without saying that the biological damage from a war, in which many nuclear bombs would be used, would be incomparably larger than that from tests; the main immediate problem before mankind is thus the establishment of conditions that would eliminate war.

#### "5. Science and International Cooperation

"We believe that, as scientists, we have an important contribution to make toward establishing trust and cooperation among nations. Science is, by long tradition, an international undertaking. Scientists with different national allegiances easily find a common basis of understanding: they use the same concepts and the same methods; they work toward common intellectual goals, despite differences in philosophical, economic, or political views. The rapidly growing importance of science on the affairs of mankind increases the importance of the community of understanding.

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"The ability of scientists all over the world to understand one another, and to work together, is an excellent instrument for bridging the gap between nations and for uniting them around common aims. We believe that working together in every field where international cooperation proves possible makes an important contribution toward establishing an appreciation of the community of nations. It can contribute to the development of the climate of mutual trust, which is necessary for the resolution of political conflicts between nations, and which is an essential background to effective disarmament. We hope scientists everywhere will recognize their responsibility, to mankind and to their own nations, to contribute thought, time and energy to the furthering of international cooperation.

"Several international scientific undertakings have already had considerable success. We mention only the century old, world wide cooperation in weather science, the two International Polar Years which preceded (by seventy-five years and twenty-five years respectively) the present International Geophysical Year, and the Atoms-for-Peace Conferences. We earnestly hope that efforts will be made to initiate similar collaboration in other fields of study. Certainly they will have the enthusiastic support of scientists all over the world.

"We call for an increase in the unrestricted flow of scientific information among nations, and for a wide exchange of scientists. We believe that nations which build their national security on secrecy of scientific developments sacrifice the interests of peace, and of the progress of science, for temporary advantages. It is our belief that science can best serve mankind if it is free from interference by any dogma imposed from outside, and if it exercises its right to question all postulates, including its own.

"6. Technology in the Service of Peace

"In our time, pure and applied science have become increasingly interdependent. The achievements of fundamental, experimental and theoretical science are more and more rapidly transformed into new technological developments. This accelerated trend is manifest, alike in the creation of weapons of increased destructiveness, and in the development of means for the weapon increased wealth and well-being of mankind. We believe that the tradition of mutual understanding and of international cooperation, which have long existed in fundamental science, can and should be extended to many fields of technology. The International Atomic Energy Agency, for example, aims not merely at cooperation for establishing facts about atomic energy, but also at helping the nations of the world to develop a new source of energy as a basis for the improvement of their material welfare. We believe that international cooperation in this and other fields, such as economic development and the promotion of health, should be greatly strengthened.

"The extremely low level of living in the industrially underdeveloped countries of the world is and will remain a source of international tension. We see an urgent need to forward studies and programmes for the effective industrialization of these countries. This would not only improve the level of living of the majority of the population of the world; it would also help reduce the sources of conflict between the highly industrialized powers. Such studies would offer fruitful scope for cooperative efforts between scientists of all nations.

"The great increase in the ease and speed of communications, and our increasing understanding of how the forces of nature influence the living conditions of nations in different parts of the world, show us, in a way not previously possible,

the prosperity of individual nations is connected with, and dependent upon, that of mankind as a whole; and how rapidly it could be increased by common international effort. We believe that through such common effort, the coexistence between nations of different social and economic structure can become not merely peaceful and competitive, but to an increasing degree cooperative, and therefore more stable.

"As scientists, we are deeply aware of the great change in the condition of mankind which has been brought about by the modern development and application of science. Given peace, mankind stands at the beginning of a great scientific age. Science can provide mankind with an ever-increasing understanding of the forces of nature and the means of harnessing them. This will bring about a great increase in the well-being, health, and prosperity of all men.

"7. The Responsibility of Scientists

"We believe it to be a responsibility of scientists in all countries to contribute to the education of the peoples by spreading among them a wide understanding of the dangers and potentialities offered by the unprecedented growth of science. We appeal to our colleagues everywhere to contribute to this effort, both through enlightenment of adult populations, and through education of the coming generations. In particular, education should stress improvement of all forms of human relations and should eliminate any glorification of war and violence.

"Scientists are, because of their special knowledge, well equipped for early awareness of the danger and the promise arising from scientific discoveries. Hence, they have a special competence and a special responsibility in relation to the most pressing problems of our times.

"In the present conditions of distrust between nations, and of the race for military supremacy which arises from it, all branches of science - physics, chemistry, biology, psychology - have become increasingly involved in military developments. In the eyes of the people of many countries, science has become associated with the development of weapons. Scientists are either admired for their contribution to national security, or damned for having brought mankind into jeopardy by their invention of weapons of mass destruction. The increasing material support which science now enjoys in many countries is mainly due to its importance, direct or indirect, to the military strength of the nation and to its degree of success in the arms race. This diverts science from its true purpose, which is to increase human knowledge, and to promote man's mastery over the forces of nature for the benefit of all.

"We deplore the conditions which lead to this situation, and appeal to all peoples and their governments to establish conditions of lasting and stable peace."

I should like to emphasize one very important point in the Vienna Declaration, and that is that agreements for the abolition of nuclear weapons, however desirable, would not suffice to make the world safe from disaster and that safety can only be secured when means are found of entirely preventing war. Five subsequent conferences have continued the work begun by the first three, and the scope of the conferences has been widened to embrace economics and other problems not belonging to the physical sciences. When such problems are discussed, authorities on the matters concerned are invited to participate in the conferences.

Although the measure of support obtained by the Movement has increased, the impact upon public opinion has not been so great as might have been hoped. The general public tends to have an attitude of suspicion towards scientists, regarding them somewhat as magicians were regarded in former times. They are thought, partly, to be people with strange powers which they have acquired by something like a pact with the Devil, and, partly, as wooly-headed idealists totally divorced from reality. There is a resistance against their pronouncements which is due to the incomprehensibility of their work and a fear that they may establish a technical aristocracy. In the Armed Forces there is a different kind of resistance. The gallant General who rides a horse brandishing a sabre and shouting "Charge!" is a traditional figure easily understood and inheriting centuries of admiration. To a great extent, this traditional figure has been replaced by a new one - the gallant and ruthless Airman or Commando. But this new figure will be equally out of date in a nuclear war if it occurs. The scientist, ill dressed, unmilitary, unaccustomed to horses and physical exercise, and perhaps even with long hair, is the sort of person whom eminent military officers have despised ever since they were school-boys. They have to admit that those odd beings have strange but indispensable powers, but they admit it with reluctance and resent their incursion into military problems. When the A-bomb was new, all the scientists agreed that the Russians would very soon have it. When this proved true, the non-scientific world assumed that traitors must be responsible. There were traitors, but all competent scientists were agreed that they contributed little to Soviet acquisition of A- and H-bombs.

The Pugwash Conferences have proved that men of science, in the main, are better guides to policy than men who do not understand the problems concerned, even if such men are eminent statesmen or generals. I do not think that all

scientists are noble men or that they are always wise. Like other men, they are fallible and, alas, sometimes cowardly. But they have information denied to others, and that information and such wisdom as they have should be made known to the public and built upon by the Authorities, the men in power - as it is very definitely not at present. It is unfortunate that the organs of publicity - the Press, radio and television - have not seen fit to give any but the most meagre publicity to the pronouncements of scientists in conference, and that the best wisdom available has therefore remained unknown to all but a few. One must continue to hope that the wisdom of experts will gradually percolate to the general public and even to Governments. Recent statements by Mr. McNamara and Mr. Rusk show that some members of the Administration have become aware of some of the facts that Pugwash Conferences have tried to bring to the notice of the Authorities and the public. These statements make it possible to hope that knowledge as to the possible effects of nuclear warfare and the risk of unintended war will come to be more generally known. If this happens, the Pugwash Movement, along with other similar movements, will have achieved its purpose.