

# Meetings

## Science and Survival:

### The Pugwash Conference at Sochi, U.S.S.R.

In 1955, Bertrand Russell and Albert Einstein issued their famous appeal to the scientists of the world to act in concert in order to prevent the outbreak of nuclear war. This appeal resulted in a conference held in Pugwash, Nova Scotia, in 1957, which included scientists from the United States, U.S.S.R., Peoples Republic of China, France, Britain, and five other countries. These conferences have been continued up to the present time and are concerned with the continuing theme of nuclear arms control and disarmament. The most recent conference, the 19th, was held 20-27 October in the resort city of Sochi, on the eastern shore of the Black Sea in the Soviet Union. Here 101 scientists from 29 different countries (unfortunately, China was not included this time) met to discuss ways and means of survival in an increasingly perilous nuclear age.

The participants felt that the world situation is very serious today. The arms race is increasing in intensity; weapons of mass destruction multiply and new weapons systems are being introduced. Most countries are increasing their arms expenditures not only without adding to their security but also to the detriment of investment badly needed to raise living standards, particularly in the developing parts of the world. Armed conflicts going on in several areas of the world present serious dangers of escalation into a global conflagration.

In the conference, the members formed five working groups which focused their discussions on selected areas. They then presented papers which were discussed by the conference as a whole. In addition to these presentations, more than 40 papers were submitted by participants. All of this material will be published as a book.

A central issue concerned the pros-

pects for another escalation in the strategic armaments levels of the United States and the U.S.S.R. This is now a particularly acute problem because of the possibility of Antiballistic Missile (ABM) and Multiple Independently Targetable Reentry Vehicle (MIRV) deployment, which will lead to a new and very dangerous stage in the steeply ascending spiral of the strategic arms race. There was general agreement that deployment of either of these weapons systems would almost certainly have the effect of introducing large uncertainties into the calculations made by both sides of the level of strategic armaments required to deter a nuclear attack. It would seem virtually certain that strategic force levels would therefore be greatly expanded. This is due to the combination of assumptions by each side that the capabilities of the other side would be at the highest possible level, together with the assumption that its own capabilities are at the lowest level of the range of uncertainty. This type of strategic thinking, involving the "worst case" analysis, has always been used in the past as a pretext to justify very great arms increases. The conference felt that this approach, instead of making the world safer, has resulted in a diminution of the security of all nations. An expansion of armaments would not only increase the waste of resources and the danger of accidental or unauthorized launching of nuclear-armed missiles, but would also increase the probability of nuclear war, since one or another of the major nuclear powers might conclude that there are advantages to be gained by striking first rather than accepting the risk of a first blow by its adversary.

With these considerations in mind, the group unanimously concluded that early negotiation of an agreement to limit strategic armaments was a matter of highest priority, and that indeed

the urgency was particularly great with respect to the deployment of ABM's and MIRV's and in the testing of the latter. Action on this problem should be at the top of the agenda of the Soviet-American Strategic Arms Limitations Talks (SALT). Effective deterrence can be obtained with a drastically reduced level of nuclear stockpiles. Furthermore, movement toward such reduced levels would provide opportunities for making other progress in disarmament. Technical issues in this area were considered in detail.

Other subjects discussed included the desirability of early ratification and implementation of the Nonproliferation Treaty, as well as the strengthening of the proposed treaty banning the emplacement of nuclear weapons on the sea bottom.

It was urged that countries that have not yet subscribed to the Partial Test Ban Treaty should do so now. Concern was also expressed about the extent of present underground nuclear testing. There was a consensus that difficulties in the detection of underground tests have now been reduced to the point where they are no longer a serious impediment to extending the nuclear test ban to include underground testing.

It was felt that there is considerable and unwarranted complacency on the part of the general public and among many government officials about the seriousness of the present military situation, a complacency which is in part the result of our having had certain limited successes in arms control, such as the Partial Test Ban Treaty. This complacency is primarily the result of our having lived with nuclear weapons without their having been used for over two decades. The enormity of the destruction that would result from a full-scale nuclear war with present stockpiles of nuclear weapons is simply not comprehended by the general public. Scientists have a great responsibility to help educate the public about this.

The discussions on chemical and biological warfare concentrated on the implementation of an effective international ban on the development, production, and stockpiling of these weapons. The group felt that the Geneva Protocol of 1925 has been an effective instrument of conventional law, but that steps beyond the Protocol, which only bans first use of these weapons, are urgently needed. Dangers of weak-

ening the Protocol can be foreseen if it were interpreted as permitting the use of chemical agents in war which are customarily used in peacetime. In wartime, for example, riot control agents can be used to increase the lethality of conventional weapons. Thus it is important to develop ways of defining acceptable peacetime uses of chemical and biological agents in the general context of a prohibition of their use in war.

As an outgrowth of previous Pugwash Conferences, an experimental system of laboratory inspection for biological weapons has been developed by the Peace Research Institute in Stockholm. Field inspection trials have been carried out in both Eastern and Western countries. It was felt that this experiment had yielded fruitful results, both in regard to the technical problems of verifying observance of nonproduction agreements and in arousing the interest and active participation of several countries, in both the East and West.

In recent years, Pugwash Conferences have included discussions of the ways in which science and technology may help to narrow the gap between the more developed and the less developed countries, since this gap is as much a threat to peace as the arms race between the developed countries. In one working group at Sochi, food supplies and population growth were considered. In addition, a novel proposal was discussed concerning the development of an International Foundation for Scientific and Technical Development. This foundation would serve to support research by scientists and technologists of developing countries in their own academic institutions and laboratories. A rather detailed outline of the structure of this foundation was presented together with the types of research to be supported by it. The group suggested that funds could come to this foundation not only from governments and intergovernmental agencies, but also directly from industries, foundations, and individuals. In addition to furthering development, the formation of such a foundation would also have an important role in solving some of the problems of the "brain drain."

Other working groups at the conference discussed European security and current military conflicts, including the Middle East and Nigeria. Scientists were present from countries on both sides of these two conflicts, and

this facilitated a frank exchange of views.

The Pugwash Conferences serve a useful function in being an unofficial channel of communication between scientists of the East and West. Previous conferences have developed useful initiatives as, for example, the London Conference in 1962, at which the idea of an automated seismograph, the so-called "black box," was introduced as a possible means for facilitating the development of a nuclear test ban treaty. However, a somewhat less tangible, but nonetheless important, by-product of these conferences develops from one's exposure to scientists who have another point of view. These personal contacts impart a sense of perspective to the problems of disarmament which cannot be achieved simply by studying the problems in the abstract. Participants come to these meetings with a wide variety of backgrounds and intellectual disciplines. They are selected by the individual national Pugwash organizations which, in the United States, consists of the Pugwash Committee of the American Academy of Arts and Sciences. Although the meetings are unofficial, many of the participants have official positions with their respective governments or have had them in the past. At the meeting in Sochi several American scientists (P. Doty, Harvard; R. Garwin, Columbia; D. Glaser, University of California, Berkeley; G. Rathjens, M.I.T.; R. Revell, Harvard; J. Ruina, M.I.T.; H. York; University of California, La Jolla) have or formerly had responsible positions in the Department of Defense, the President's Science Advisory Committee, or Arms Control and Disarmament Agency. Experts who now hold or who have held analogous positions in other countries were present. It is possible that one of the chief beneficial effects of these meetings is that they allow in a nongovernmental context the exploration of many ideas and concepts relating to disarmament which can be discussed in a freer atmosphere than would be the case if they represented government policy.

The outstanding characteristic of the 19th Pugwash Conference at Sochi was the general sense of agreement between Eastern and Western participants concerning the necessary steps which must be taken in our search for world security. Although there were some differences in detail, there was nonetheless a feeling that there is one common road along which the United States

and the U.S.S.R. should proceed in order to achieve a more secure world. Just as the conference ended, the announcement was made of the beginning of the Strategic Arms Limitation Talks, which are now being held in Helsinki, Finland. As a small group of Russian and American conferees discussed these talks, they agreed that these SALT negotiations would have the quality of IQ tests for the two countries. It is clear that a greater degree of security can be obtained with a substantial reduction in strategic arms. It will perhaps be a test of our joint intelligence to see whether we can proceed in that direction.

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## Forthcoming Events

### April

1. **Arkansas Acad. of Science**, Russellville. (G. E. Templeton, Div. of Plant Pathology, Univ. of Arkansas, Fayetteville 72701)

1-3. **National Pollution Control Conf. and Exposition**, San Francisco, Calif. (Nat. Pollution Control Conf. and Exposition, P.O. Box 13116, Houston, Tex. 77019)

1-4. **International Conf. on Combinatorial Mathematics**, New York, N.Y. (L. R. Neville, New York Acad. of Sciences, 2 E. 63 St., New York 10021)

1-4. **National Council of Teachers of Mathematics**, 48th annual, Washington, D.C. (J. D. Gates, Executive Secretary, 1201 16th St. NW, Washington, D.C. 20036)

1-4. **International Conf. on Thermodynamics**, Cardiff, Wales. (Meetings Officer, Inst. of Physics and the Physical Society, 47 Belgrave Sq., London, S.W.1, England)

2-4. **Michigan Acad. of Science, Arts, and Letters**, 74th annual, Detroit, Mich. (T. G. Overmire, MASAL, 1721 Washtenaw, Ann Arbor, Mich. 48104)

2-4. **Eastern Psychological Assoc.**, Atlantic City, N.J. (W. W. Cumming, 353 Schermerhorn Hall, Columbia Univ., New York 10027)

2-4. **Association of Southeastern Biologists**, Lakeland, Fla. (D. C. Bliss, Box 278, Randolph Macon Woman's College, Lynchburg, Va. 24504)

6-8. **Mineralogical Soc. of Great Britain and Ireland**, London, England. (P. Wilkinson, Dept. of Geology, Univ. of Sheffield, Sheffield-S1 3JD, England)

7-10. **American Optical Soc.**, Philadelphia, Pa. (M. E. Warga, The Society, 2100 Pennsylvania Ave., NW, Washington, D.C. 20006)

8-11. **American Acad. of Oral Pathology**, San Diego, Calif. (S. M. Standish, c/o Indiana Univ. School of Dentistry, Indianapolis 46202)

9-10. **Metabolism and Biological Func-**