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PUGWASH NEWSLETTER

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Editor: M.M. Kaplan

CONTENTS

Reports of the Pugwash Conferences, Symposia and Workshops represent the views of the individuals attending a particular meeting. Occasionally, the Pugwash Council or its Executive Committee issues official statements on behalf of Pugwash.

VISIBLE FRUITS - AND THORNS

Since January 1980, following the NATO decision of December 1979 to deploy Pershing IIs and ground-launched cruise missiles to counter-balance deployment of SS-20s by the USSR, Pugwash has held a series of workshops on the problem of nuclear forces in Europe. Discussions in these workshops have centered on possible steps to halt and begin reversal of the continuing escalation in the arms race. These talks have led to a major recommendation for a moratorium on deployment of all such weapons pending and during negotiations. The need for such an action was emphasized by the Pugwash Executive Committee and in the discussions and report of our fifth workshop held in December 1981. Also recommended were unilateral and unconditional reductions in intermediate-range nuclear weapons to encourage progress in the USA-USSR bilateral negotiations which began in November 1981 (see Newsletter of January 1982).

President Brezhnev's statement of 16 March announced that just such steps had been instituted by the USSR. While we cannot state categorically that there is a direct relationship between the Pugwash discussions and this significant move, we have good reason to believe that it was not mere coincidence.

The negative response of NATO to the USSR gesture should not remain unchallenged, for this would mean another lost opportunity to make progress. If East-West relations continue to deteriorate, an unchecked arms race and possible confrontations signalled in Brezhnev's speech would be likely to result. But a most helpful development has occurred lately: public opinion in many countries of the East and West favouring a freeze and cutback in nuclear weapons is making itself felt in the media, in numerous communities, universities and professional organizations, and in the US Congress. Individual Pugwashites are prominent in many of these activities, and the technical expertise and personal respect they command lends considerable weight to their efforts. We should take advantage of the strong forces represented by such public action to rally our scientific colleagues to the forefront of these endeavours. An excellent example is the Second Congress of the International Physicians for the Prevention of Nuclear War held in Cambridge, UK, 3 to 6 April, in which many from Pugwash contributed importantly to its success. (Incidentally, Pugwash gave over one of its offices in London to serve as Headquarters of the organizing committee of the Congress).

The first and most obvious step in arms negotiations would be a freeze at present levels in both production and deployment of the intermediate-range weapons but this move should be followed as quickly as possible by significant reductions in nuclear arsenals, as something tangible upon which to base further advances in the matter. It might then be possible to telescope the usual long drawn-out negotiation process.

Sustained efforts will be necessary to spell out and resolve the issues involved, and Pugwash will continue to give priority to these tasks. Thus, our sixth workshop on nuclear forces in Europe, extended to include the general problem of strategic weapons, has been advanced to 5 and 6 June from the tentative date which had been set for December 1982.

Another recent tangible accomplishment of Pugwash is the book prepared in collaboration with UNESCO on "Scientists, the Arms Race and Disarmament" (see p.149) The final touches to the manuscript were made at a Pugwash/UNESCO Symposium held in Ajaccio, Corsica, on 19-23 February. Major credit for this endeavour goes to Joseph Rotblat who undertook the unenviable task of editor. It is hoped that the book will be published in record time for it to be available for the second UN Special Session on Disarmament scheduled to open in June.

The meeting in Corsica was made possible by our hosts, the Association for Scientific Meetings in Corsica headed by Mr. Raymond Ceccaldi and Mr. Jean Nicoli of Ajaccio, who organized the efficient local facilities. Generous financial and staff support was provided by UNESCO. Interesting visits were made by the group to

Corte and Sartene. We were charmed and moved at a reception given by the major of a small village (population 200) in the Corsican mountains, St. Pierre de Venaco, when he gave a short speech invoking the words and spirit of the Russell-Einstein Manifesto.

The Pugwash Council met in Ajaccio for two days (and nights) preceding the Symposium, the major item on the agenda being preparations for the Warsaw Conference. The present state of martial law in Poland threw a shadow on the Council's discussions, and the matter was thoroughly explored. It was decided to proceed with the invitations, as assurances were given by the Polish Pugwash Group that the norms of a Pugwash Conference would be met (see p.143). The deliberations of the Council centered on adequate administrative facilities for running the Conference, the granting of visas to all invitees, and freedom of media communications and of discussions at the Conference. The question of holding a conference in a country where a state of martial law exists was discussed at great length. The Council concluded that it would be unwise to allow the venue of a Pugwash meeting to be determined by the prevailing conditions and character of the regime in a host country, since this would negate a major feature of Pugwash which is to maintain the dialogue between opposing sides, whatever the conditions, especially in times of crisis. The holding of a Pugwash meeting in a country in no way condones the regime of that country; otherwise many countries would be ineligible for such meetings, given the diversity of political views among Pugwashites.

Our ninth workshop on Chemical Warfare (CW) was held in Geneva on 12-14 March, again supported through the sustained efforts of the Friends of Pugwash in Switzerland. The background papers and discussions on this timely subject were of great interest (see p.152). Bilateral USA-USSR negotiations on CW are presently at a standstill and the expert CW group under the UN Committee on Disarmament is making little progress. This is largely due to the allegations by the USA of the use of lethal chemical weapons in Afghanistan, Kampuchea and Laos with the complicity of the USSR. These accusations have been denied by the USSR who state that they are an excuse for renewed chemical rearmament by the USA. Most of the participants considered that the published evidence to date was far too little to support the allegations, and measures were suggested for improved mechanisms for verification of compliance with international agreements now in force, and to be elaborated in the future, concerning chemical and biological weapons. With the USA decision to proceed with the production of binary weapons, the prospects of achieving the long sought for treaty banning development, production and stockpiling of chemical weapons have receded further than ever. But Pugwash provides the only forum for discussion of the subject where uninhibited and objective private discussions by experts from opposing sides can take place. Hence, we shall have to persevere.

M.M. Kaplan

FOOTNOTES ON THE BANFF CONFERENCE: REFUSAL OF VISAS

We have had strong repercussions to the refusal by the Canadian Government of visas for two of our Soviet colleagues (see Newsletter, October 1981). In our Newsletter of January 1982, p.98, we published a report by the Netherlands Pugwash Group and we reproduce one below from the French Pugwash Group. The Council at its meeting in Ajaccio on February 17 and 18 prepared a statement on this matter (below) in order to put on record our official stance on visas and other associated problems which may arise concerning the venues of future Pugwash Conferences. This is also discussed in my editorial above.

However, these reactions should not detract from the excellent job carried out by the Canadian Pugwash Group, headed by William Epstein, for the organization of the Conference, and the fine hospitality and gracious participation of Mrs. Cyrus Eaton, which made the Conference a very pleasant memory for all who participated. Moreover, the Conference itself would not have been possible without the generous financial support of the Canadian Government.

M.M.K.

STATEMENT OF THE COUNCIL

The Pugwash Council at its 56th session held in Corsica, France, on 17-19 February 1982, took note of the protest by the Netherlands Pugwash Group published in the Pugwash Newsletter (January 1982, Vol.19, No.3., p.98). This concerned..."the fact that the Pugwash Council did not register an effective protest, as could have been done by cancelling the opening ceremony..." of the Banff Conference (August 1981). when ..."two Russian Pugwash colleagues who were invited to attend the Banff Conference were refused visas by the Canadian Government..."

News of this refusal was received a few days before the opening of the Conference, and strong representations were made to the Canadian Government. Until the time of the Conference opening, the Council hoped that this decision would be reversed. This reversal did not occur and a public protest was issued at the opening session. (See Newsletter, October 1981, p.50)

The Council reaffirms Pugwash policy that no Pugwash Conference will be held in a country unless bone fida assurances are received from the national Pugwash Group of the host country that all invitees to a Conference will be granted visas, and that the norms of a Pugwash Conference will be respected. These include complete freedom to discuss any topic of the Council's choice in the sessions of the Conference, and uninhibited communication with the world press and other media both within and outside the country where the Conference is held.

STATEMENT OF THE FRENCH PUGWASH GROUP

The French Pugwash Group have taken notice of the protest of the Dutch Pugwash Group about the refusal of visas to Russian Pugwash colleagues, which appeared in the Pugwash Newsletter of January 1982 (p.98).

We fully endorse this protest. We wish to insist on the importance for Pugwash not to tolerate any attempt to hinder the free participation of its invitees to meetings.

Although we consider that cancelling an opening session is a significant gesture of protest, we think that Pugwash should take an unequivocal stand on the matter:

1. Appropriate assurance should be obtained from the inviting country to issue in adequate time visas to all invitees.
2. If, nevertheless, invitees could not attend because of obstacles in delivery of visas, we recommend that the meeting should not open until their arrival, and if necessary be cancelled.

Free circulation of scientists is essential for the very existence of Pugwash.

"SCIENTISTS, THE ARMS RACE AND DISARMAMENT"
PUGWASH/UNESCO SYMPOSIUM, Ajaccio, Corsica, 19-23 February 1982

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CONCLUSIONS AND RECOMMENDATIONS

(Adopted by the Ajaccio Symposium)

1. The nuclear arms race, which has resulted in the creation of an unprecedented and awesome potential for destruction, is one of the outcomes of the remarkable advances in science and technology during the past few decades. The achievements of science have momentous implications in all aspects of life of the world community, including a radical change of traditional concepts of security and national power. Yet, the call in the Russell-Einstein Manifesto that a new way of thinking is essential if mankind is to survive in the new situation that has arisen from the progress of science has largely gone unheeded. National security is still measured by the strength of military arsenals, and super power is equated with the capacity to inflict unimaginable damage on an adversary. As a consequence, the nuclear arms race accelerates its pace and engulfs an increasing number of nations, although everybody knows that it may lead to the annihilation of civilization.

2. The arms race is primarily the product of political forces. But scientists themselves contribute to this disastrous trend in world affairs. About half a million scientists and technologists - a high proportion of the total scientific manpower - are directly employed on military research and development. They are continually devising new means of destruction, making the existence of the human species on this planet ever more precarious. In particular, the nuclear arms race feeds on the continuous input of scientific innovation, and there is a growing belief that the momentum of this arms race is determined by the actions of scientists. This belief is exaggerated; a multitude of factors, interacting with each other, is involved, commonly expressed as the military-industrial complex. But the introduction of any new weapon is an irreversible step, and in this sense the role of the scientists in the arms race is of crucial importance.

3. This role of scientists is contrary to their traditional calling. The objectives of scientific endeavour should be a service to mankind, helping to better the fate of man and raise material and cultural standards. The basic unmet needs of a majority of the people in the world present a challenge great enough to warrant a huge and sustained effort by scientists. For an enormous effort of scientists to be instead directed towards wholesale destruction, to return to a state of primitive savagery among the survivors of a nuclear war, is an unforgivable perversion of science.

4. This world would be a much safer place if scientists in all countries would simply refuse to engage in military research. While realizing that, as a professional group, the scientists alone cannot easily act in complete isolation from their political and economic context, we implore those who are employed in the military R & D establishments to ponder on the social implications of their work and then leave it to their conscience to dictate their further conduct.

5. In any case, there is an urgent task for all scientists to help in stopping and reversing the arms race, and to work for genuine disarmament measures, ultimately leading to general and complete disarmament. Scientists have already demonstrated that their efforts in these directions can be fruitful and effective. Movements of scientists - such as the Pugwash Conferences on Science and World Affairs, which provide a forum for objective and informative debate between scientists from East and West, North and South - have made valuable contributions to the international negotiations on arms control. These negotiations have led to few agreements, but without

them the arms race might have acquired even more catastrophic dimensions. The work of institutes of peace research provides factual information of great value to those concerned with the implementation of disarmament measures.

6. This urgent task can no longer be left to the small number of scientists actively involved in the effort to stem the arms race. It should be the duty of all scientists to acquaint themselves with these issues. There is a tremendous scope for scientists to counteract the arms race and seek means to reduce the threat of a nuclear war. If the drive towards avoidance of war is to make headway, it must involve a much larger number of scientists; an increase by at least an order of magnitude is necessary to make the number comparable with that of the scientists involved in military R & D.

7. We call on the scientific community to give their time and thought towards these objectives. A determined effort is needed to promote collaboration for peaceful purposes in fields of research where there is now competition for destructive purposes; to elaborate specific steps of arms reduction; to give early warning on the dangers of new developments; to collaborate with current medical campaigns in informing the public of the likely consequences of a nuclear war; to take part in disarmament education.

8. Specifically, we recommend the following tasks for scientists:

- maintain contact between scientists from different social and economic systems, drawing on the common interests and values of the international scientific community, and explore through such contacts all possibilities of resolving conflicts and fostering progress towards disarmament:

- study the technological aspects of the arms race so as to be able to offer expert advice on these matters to decision makers and the general public;

- support efforts to limit and eventually stop the nuclear arms race, in particular to conclude without delay a Comprehensive Test-Ban Treaty;

- monitor destabilizing developments in the arms race and warn the public about them;

- contribute to the ongoing research on the economic consequences of disarmament so as to be able to allay fears about unemployment and to find alternative opportunities for the utilization of resources and manpower at present employed on military projects;

- participate in national and international meetings of scientists to debate and seek means of disseminating the findings of the studies mentioned above;

- encourage the setting up of an international committee of scientists to analyse the consequences of the nuclear arms race and report their conclusions;

- address lay audiences and mass media and provide them with factual information about the dangers and likely outcome of a nuclear war;

- use their influence in scientific academies and institutions to induce them to devote some of their activities and budgets to the above issues;

- urge editors of scientific journals to provide space for discussions on those issues;

- promote disarmament education and, in particular, the inclusion of disarmament-related issues in the curricula of schools and universities;

- seek the effective implementation of the UNESCO recommendation on the status of scientific researchers.

9. We further recommend that UNESCO:

- intensify efforts to promote goals and means of disarmament education, in the most effective manner;

- mobilize the world scientific community to make its contribution to the scholarly study of the problems of the arms race and of disarmament in both developed and developing states, and to ensure the wide distribution of the results of such study.

10. Finally, we recommend that the Second Special Session of the General Assembly devoted to Disarmament:

- assure that studies of armaments and disarmament are more closely linked with arms control and disarmament negotiations;

- increase the usefulness of disarmament studies of the United Nations to ongoing or planned negotiations, and avoid duplication by reinforcing the role of the Centre for Disarmament as co-ordinator of these activities;

- launch the World Disarmament Campaign under the responsibility of the Secretary-General, with special responsibilities for UNESCO in its field of competence, and involve in the Campaign the scientific community as well as appropriate non-governmental organizations such as Pugwash.

11. The continuing arms race with no prospect for its reversal in sight, and the ensuing threat of a nuclear holocaust, produce fear, frustration and a feeling of helplessness and hopelessness among people, particularly in the young generation. They also lead to apathy and pessimism in the ranks of the scientific community. But a formulation of specific tasks may hearten and activate scientists to do something worthwhile and enable them to return science back to its true calling. We believe that the above recommendations, including those addressed to the United Nations and UNESCO, if implemented, would provide the much needed optimism that it is still possible to prevent catastrophe; and the hope - indeed the conviction - that scientists have an important role to play in the creation of conditions for a secure and peaceful world.

REPORT ON THE SYMPOSIUM*

Background

1. Although Pugwash does not normally undertake joint activities with other organizations, the common interests it has with UNESCO led to successful preliminary negotiations during the Annual Conference held in Breukelen, Netherlands, in August 1980 for a joint activity in preparation for the Second Special Session of the United Nations General Assembly devoted to Disarmament.

2. On the basis of the agreement in principle from Pugwash to collaborate with UNESCO in an activity relating to the role of scientists in the arms race and disarmament, the following passage was included in the Programme and Budget for 1981-1983 of UNESCO presented at its General Conference in Belgrade in October 1980.

> A new research will begin on the role of scientists in the arms race. To this end, and in co-operation with the Pugwash Movement, an expert meeting...will be organized to assess this role and to draw up concrete proposals.

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*Note by the Editor

To avoid the time-consuming process of trying to obtain a fully agreed text at workshops or symposia, we have adopted the practice of having a report prepared by one or two of the participants to reflect the gist of the discussions. As noted on the inside cover of each Newsletter, only the Pugwash Council or its Executive Committee can issue official statements on behalf of Pugwash.

3. In order to carry out this activity, it was decided at a meeting of representatives from UNESCO's Natural Science Sector, its Social Science Sector, and Pugwash, in March 1981, to prepare a joint publication, preferably in time to be available for the Second Special Session, and to convene a symposium to discuss the same topic on the basis of the manuscript of the publication. Accordingly, contracts were concluded between UNESCO and Pugwash for the preparation and holding of the symposium and for the drafting of the book. Arrangements were made with the Association pour les Rencontres Scientifiques Internationales en Corse (APRISEC), established on the occasion of the joint UNESCO/Pugwash Symposium, for the local facilities. The symposium took place at the Salle des Congres of Ajaccio, Corsica, from 19 to 23 February 1982.

Participants

4. Thirty-three scientists from twenty-five countries participated in the five days' work of the symposium. They were selected jointly by UNESCO and Pugwash and attended in their individual capacity, in no way committing the governments or national or international institutions to which many of them are affliated.

Results of the Symposium

5. The symposium accomplished three tasks: it reviewed the manuscript of the proposed joint publication, prepared the first draft of a shortened version for wider distribution, and adopted a set of conclusions and recommendations.

6. Twenty authors contributed to the publication, either through chapters prepared in advance of the symposium or through additional chapters accepted by the symposium. All the editorial tasks were undertaken, under contract with UNESCO, by Professor Joseph Rotblat. All the chapters were carefully reviewed by the symposium, or, in one case, an outline was presented and the essential contents presented orally. In addition to the editorial changes made by Professor Rotblat or by UNESCO, the authors were invited to consider the comments and suggestions of the participants and modified their texts where appropriate. The book is a co-publication of the UNESCO Press and Taylor & Francis. It also contains the conclusions and recommendations of the symposium and several appendices. The table of contents of the book is appended.

7. The shortened version, of approximately twenty pages, is aimed at the general public and hopefully will be translated into several languages.

8. As regards the conclusions and recommendations, they were drafted in several sessions on the basis of an original text by Professor Rotblat and several written and oral amendments. All the participants subscribed to the document, which constitutes an appeal to scientists, to UNESCO, and to the Second Special Session of the General Assembly.

Some highlights of the discussions

9. While the meeting examined the manuscript of the book chapter by chapter, a certain number of substantive issues were discussed and divergent views were expressed on several points. The book does not always reflect this discussion although on many points the authors modified their texts in the light of the views expressed or the new information provided. Each chapter remains the sole responsibility of the author as regards the choice and interpretation of facts and the opinions expressed. The meeting stressed the need to respect a plurality of views in the publication. Many Pugwashites reject the doctrine of nuclear deterrence, for example, although the book contains several passages which support that doctrine, or at least explain why it is a fact of life.

10. Considerable attention was devoted to the need to balance the analysis of East/West confrontation and the nuclear arms race with a Third World perspective taking into account such issues as the location of the armed conflicts which have occurred since the Second World War, the relationship between disarmament and development, and security concerns of countries who will not sign the Non-Proliferation Treaty. It was pointed

out with emphasis that a sentimental appeal to overcome poverty and feed the starving through redeployment of resources would not influence the course of the arms race. Concerning raw materials, their scarcity was cited as a factor in conflict formation leading to the possible use of military force, although this view was challenged on the hypothesis that problems of raw materials would be overcome if resources were freed from military applications.

11. Differing perspectives were expressed concerning the most appropriate way to deal with the theme of the responsibility of scientists. Some stressed the responsibility of politicians rather than scientists for the arms race. It was also pointed out that the term "scientists" is perhaps misused in relation to military R & D as most of the work is done by technicians, often low grade ones, rather than by scientists. References to the moral or ethical superiority of scientists was criticized as being arrogant and unsuitable to the aims of the book.

12. Several opinions were expressed concerning the overall tone of the book as overly optimistic in the light of recent events which seem to reveal a psychological preparation for war. On the whole, the meeting agreed that the perspective of concerned scientists, all committed to the Russell-Einstein Manifesto, should be brought to the attention of the General Assembly. It was also suggested that the United Nations should be urged to codify the principles so far approved in disarmament negotiations into a corpus of an international law of disarmament. Other specific recommendations addressed to the United Nations, to UNESCO and to scientists in general were thoroughly discussed and included in the Conclusions and Recommendations.

13. The latter in fact summarize the essential points of the meeting while the preceeding paragraphs merely touch on a few of the many other matters discussed in Ajaccio. It now rests with those who will be involved in the Second Special Session to see that the joint efforts of UNESCO and Pugwash to review the role of scientists in the arms race and disarmament, and to formulate concrete proposals, will have the impact it deserves.

Stephen Marks

UNESCO - Pugwash Book

SCIENTISTS, THE ARMS RACE AND DISARMAMENT

Edited by Joseph Rotblat

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CORRIGENDUM

The title of the contribution by Klaus Gottstein in the Newsletter of January 1982, p.121, should have read:

On the relative priorities between reducing the probability for nuclear war and achieving various political goals.

NINTH PUGWASH WORKSHOP ON CHEMICAL WARFARE

Geneva, Switzerland, 12-14 March 1982

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IMPRESSIONS ON THE NINTH WORKSHOP ON CHEMICAL WARFARE (CW) *

The ninth workshop of the Pugwash Chemical Warfare Study Group (PCWSG), like the previous one in 1981, did not seek to produce a final consensus report. Participants preferred to spend their time on substantive discussion. This note is intended to give Pugwash members a summary impression of what went on. As such, it represents no more, of course, than the personal views of two participants. Our note about the previous workshop is to be found in the July 1981 issue of the Newsletter.

There were 31 participants from 19 countries. Some were in Geneva with national delegations participating in the CW discussions of the Committee on Disarmament (CD) and its subsidiary ad hoc Working Group on Chemical Weapons. Others were in Geneva for the special CW-experts' meeting organized by the CD for 14-18 March which would be considering, in particular, the problem of standardizing toxicity measurement. So the ninth workshop was larger than the previous ones and well informed about the precise state of the intergovernmental negotiations. We thus had a good idea of the topics which might most usefully be pursued within the informal and private ambience of the PCWSG and which of them should better be left to the CD. The pre-agreed workshop agenda was sufficiently flexible to allow this.

The two papers that had been submitted to the Workshop had both dealt with the first item on the formal agenda: developments over the year since the 8th Workshop that bore upon the prospects for a Chemical Weapons Convention. The papers, by Miettinen and Robinson, are reproduced below, somewhat revised and shortened. During their discussion by the Workshop, three developments in particular dominated attention: the continued abeyance, at the behest of Washington, of the bilateral US-USSR CW negotiations and the decision of the US Administration, announced on 8th February 1982, to order fullscale production of a new generation of poison-gas weapons, the so-called 'binary munitions'; the intensification of the allegations by the US government that poison-gas and toxin warfare has been conducted in Laos, Kampuchea and Afghanistan, calumniating the Soviet Union; and the associated deterioration in that atmosphere of mutual confidence on which depends progress towards an acceptable CW Convention.

Some participants were more optimistic than others about the prospects for agreement under the present circumstances. It was generally recognized, however, that the background to the negotiations had now changed so much that topics which had once seemed fruitful for the PCWSG to discuss now needed to be replaced by others. Above all, efforts to hold the ground on the existing regime of international law pertaining to CBW now appeared to require at least as much priority as efforts to extend the regime by negotiating further instruments of disarmament. The US Government was indicating very clearly that it would not consider new CBW agreements unless it could be satisfied about compliance with the existing ones, namely the 1925 Geneva Protocol and the 1972 Biological Weapons Convention. Some participants expressed scepticism about the genuineness of this American stance, suspecting that it might be a mere smoke screen for the projected poison-gas rearmament. Others saw an inevitability in the linkage of the compliance issues into the disarmament negotiations. Although few of the participants felt that the evidence thus far disclosed in support of the CBW-use allega-

*See Editor's note on p.147.

tions was conclusive, some accepted it as grounds for real concern. What the international community should now do, and how scientists might contribute, were discussed in some detail (see below).

As for negotiations themselves, several workshop participants doubted whether the existing institutional arrangements provided by the CD were adequate, especially with the US-USSR bilateral working group remaining inactive. Could a committee in which more than 40 states were represented at widely differing levels of expertise, and which had tight constraints on the amount of time it could devote to CW, really elaborate anything as complex as the projected CW Convention would have to be? This was a question, some felt, which PCSWG members would usefully, and authoritatively, raise in their respective capitals. It was true that the negotiations were hung on what was essentially a political question, namely how much verification would be enough? But that could, in principle, be resolved overnight, then leaving a host of technical minutiae to delay conclusion of a treaty - during which time who could tell what new political complications might arise? Much better, then, to proceed by resolving as many of the technical details as possible beforehand, thereby easing the way towards the necessary political consensus.

Such an approach would capitalize on the existence of such bodies as SIPRI and the PCWSG. On some technical questions, the PCSWG was well ahead of the CD, notably as regards near-site and off-site techniques of inspection. A site visit made by the workshop to the Institute of Hygiene of the Canton of Geneva further extended this competence, stimulating in particular renewed examination of how existing pollution-detecting technology and organization - both of which are continuing a rapid development - might be harnessed for verification purposes. For example, it should now be possible for the Group to provide a useful assessment of the applicability of downwind air-sampling in detecting stockpiles of CW munitions. As regards the interlaboratory comparative experiement on environmental-sample analysis (see the reports on previous workshops), the next step was clearly for more of the participating laboratories to gather data on the background levels of phosphonate in their countries' river and lake waters.

As with the previous site visits undertaken by the PCWSG (in West Germany, the United States and Sweden), this one was thus a fruitful exercise, and the Workshop agreed that the series should be continued. Particular interest attached to the possibility of such a visit in a socialist country, above all for the insight it could provide into the workings of civilian chemical industry within a centrally planned economy, and hence the prospects held out for the effective operation of national verification organs in such countries.

Given the present deterioration of the atmosphere surrounding the negotiations, several participants felt a need for governments to reaffirm the progress that had earlier been made towards agreement, for there was now a pronounced tendency in some circles to belittle past achievements. For example, agreement in principle on the use of on-site inspection as a verification technique had been registered during the bilateral US-USSR negotiations; and although the disagreement on how precisely the technique was to be applied had not been resolved, the Workshop learnt that the differences between the two sides had not been as great as was popularly supposed. On the Soviet side on-site inspection was acceptable only in a challenge mode, not on a systematic routine basis. The US side had wanted the systematic mode for verifying destruction of stocks but would have been content with the challenge mode for verifying non-production, provided existing factories for CW agents and munitions were destroyed rather than merely converted for other uses. Neither side had wanted acceptance of challenge inspections at putative production sites to be mandatory. The possibility for compromise between the two sides was obviously there, but, as the climate deteriorated during 1979-80, the necessary flexibility in the negotiating positions was not available.

Whether, under present circumstances, the US Government would be prepared to reaffirm its 1977-1979 negotiating position appeared doubtful to several participants

in view of the stance of the present administration in Washington on verification. The compliance issues had hardened attitudes in Washington still further, and the view had taken hold there that the Soviet Union was interested in pursuing CW negotiations solely as a means for inhibiting US programmes to modernize the aging American CW retaliatory capability. And public statements from Moscow were portraying the US binary programme as evidence of a lack of American interest in CW disarmament. There was widespread agreement among participants, therefore, that, if the negotiations were to continue in a productive fashion, some way had to be found for either side to demonstrate to the other the genuineness of its commitment to them. Such demonstrations might, it was suggested, take the form of matched pairs of unilateral initiatives, each such initiative having sufficient substance to allay particular suspicions. The workshop spent much time discussing this idea and eventually ended up with the following suggestions:

	The United States -	The Soviet Union -
1.	Declares readiness to resume the bilateral negotiations.	Declares readiness to join in private discussions of Geneva-Protocol and BW-Convention compliance issues.
2.	Declares readiness to resume the bilateral negotiations.	Declares acceptance in principle of the systematic use of on-site inspection to verify destruction of stocks.
3.	Declares that it will not deploy any more CW weapons to Europe.	Announces that it will cut its Chemical Defence Troops by 50%.
4.	Invites visits to CW-defence training areas.	Invites vists to CW-defence training areas.
5.	Declares its stocks of CW agents/ munitions, and their locations.	Declares its stocks of CW agents/ munitions, and their locations.
6.	Declares a freeze on production of CW agents/munitions and commits itself to reducing its stocks to the Soviet level, if that is the lower.	Declares a freeze on production of CW agents/munitions and commits itself to reducing its stocks to the US level, if that is the lower.
7.	Commits itself to the objective of a CW-weapons-free zone from the Antlantic to the Urals.	Commits itself to the objective of a CW-weapons-free zone from the Urals to the Atlantic.

There was a general feeling that if items (5) and (6) could be achieved that would be a major boost to progress towards a comprehensive CW disarmament treaty, for it would get to the very heart of the current pressure for poison-gas rearmament: the American binary programme was, in the view of several of the participants, being driven mainly by fear that the USSR possessed a very large and menacing CW-weapons capability, a fear much exacerbated by the USSR's continued reticence about its capability.

With regard to the CBW-use allegations and the efforts which the international community had so far made to deal with them, there was unanimous agreement within the workshop that some form of pre-existing machinery for fact finding needed to be established which could respond to any further allegations. The account which the workshop was given of the experience of the UN Expert Investigating Group pointed up some of the requirements. Two particular possibilities were explored within working groups. One, a short-term solution, was that a neutral or non-aligned country should declare itself ready to assign a CW-defence detachment of its armed forces to any CBW fact-finding mission that might be requested of it. Such an agreement would face a number of problems, but it was felt that it could prove both valuable and

workable in the case of a falsely accused country seeking to establish its innocence. The second possibility, a longer-term solution, lay in the establishment of a Consultative Committee of states-parties to the Geneva Protocol with appropriate provisions for fact-finding investigations under the auspices of the Committee. Appended to this note is a paper detailing the scheme that was agreed by the working group concerned.

Several suggestions were made for the future work of the PCWSG:

- Continuation of the site-visit series.
- Further study of the utility of near-site/off-site verification technique, especially as regards undeclared stocks of CW agents/munitions.
- Further consideration of the details of CW-disarmament treaty scope, with particular reference to toxins.
- Collaboration with SIPRI in an analysis of the problems that have so far surfaced in the CW negotiations with suggestions of possible remedies (including, perhaps, the actual drafting of a treaty text).
- Study of the present state of antichemical protection, to include both physical and medical countermeasures.

Of these, the last would, in the view of several participants, be especially useful, for there exists a wide diversity of opinion on the overall efficiency of current measures of antichemical protection and the degree to which they interfere with or otherwise degrade routine mission performance; and there is close relationship that should be clarified between the efficiency of protection and the prospects for a Chemical Weapons Convention.

Karlheinz Lohs
Julian Perry Robinson

Appendix to Report on Ninth CW Workshop

Problems of CBW Compliance - "Long-range" Solutions

"Long-range" solutions are thought of as those whose development will clearly require a number of years. The appropriate principles and procedures will presumably in time be formulated into a negotiated document. This document could stand alone, or it could be related to the Geneva Protocol, or it could be incorporated into an eventual CW convention, with suitable references back to the Geneva Protocol and the BW convention.

A framework for thinking about solutions to compliance problems could be drawn from the discussions in the CD about a possible Consultative Commission to be established by the future CW convention. These discussions have envisaged a Consultative Commission composed of all the parties to the CW convention. This Consultative Commission would be served by a small technical staff which would maintain contact, when necessary, with the parties and which would facilitate contacts among the parties over any compliance issues that might arise.

By analogy, a Consultative Commission on problems of compliance with prohibitions on the use of chemical and biological weapons would be composed of all the parties to the Geneva Protocol. When established, it would be served by a small technical staff and would be charged with maintaining necessary contacts with states parties to the Protocol, with facilitating contacts among them, and with assisting in the resolution of any compliance problems that might arise. (Since the Geneva Protocol is a very brief, simple document concerned only with use, it would appear not to be appropriate to give this Consultative Commission and its technical staff any other area of responsibility except compliance.)

At the outset, the technical staff would of course have to establish a set of criteria and procedures for carrying out its duties. Because of the sensitivity of compliance problems, it would be only realistic to expect that many of these criteria and procedures would have to be negotiated in advance, so that governments which committed themselves to cooperate with this new body would know rather clearly what they were getting into. They would want to see that it had a good chance of being effective and also that it had arrangements to protect against frivolous or irresponsible charges of non-compliance. The negotiation of these criteria and procedures might, therefore, take considerable time and get quite far into technical detail. (They would, however, probably be less complex than procedures for verifying a ban on the production and stockpiling of CW, hence the logic of developing them separately before the CW treaty is concluded.)

It should be expected that action under the aegis of this Consultative Commission would be activated by a government which is a party to the Geneva Protocol. Charges by private persons, or in the press, or by non-governmental organizations would not activate the machinery.

It is clear what should be the relationship of this new body to the UN. It should not come under the Security Council or be obliged to work through the Council, since there should be no veto on its activity. The agreement establishing the new body should however, probably use the UN as a depository, as has become customary. A relationship between the technical staff and the Secretary-General thus seems logical, provided this staff remains free to organize in an effective, economical, and non-political manner.

The Secretary-General (or the Director of the technical staff) might also be given the right or even the duty to initiate action under the Consultative Commission in cases where no government wishes to do so and yet grave charges are being made with damaging consequences. It is a well-known scandal that wars can be launched, fought, and terminated without ever coming before the Security Council, and efforts should be made to forestall a similar situation with regard to CBW compliance. If a government knows that grave charges of use of CBW will promptly trigger a fact-finding activity, it is more likely to be cautious in launching such charges. Similarly, a government contemplating a violation of the Geneva Protocol may be deterred if a swift investigation is almost certain to result.

A report of a fact-finding effort should be standardized, so far as possible, in accordance with forms and procedures developed in advance. The report should therefore be based on standardized questionnaires, sampling techniques, etc. The report should clearly reflect any range of judgements that may develop among the expets with regard to the situation being investigated. Such a procedure would exclude any need for voting or for negotiating an ambiguous text which covers over disagreements.

If fact-finding is to be effective it must be rapid. The normal response to a complaint - or to a question which fell short of a complaint - would therefore not involve convening representatives of all the members of the Consultative Commission. Rather the technical staff under its Director would make contacts with the governments concerned. It might invite them to discuss the problem with each other directly or through its channels, or it might immediately organize and despatch a fact-finding team, or both. The publication of its findings, if appropriate, would be the end result when actions were undertaken by the technical staff. Public opinion, political or diplomatic pressures, discussions in the UN would provide the "enforcement" element for which the Consultative Commission and technical staff would clearly have no mandate.

The full plenary of the Consultative Commission might convene only every few years (to discuss the general workings of the arrangement as well as technical and budgetary questions) or when called under agreed procedures to deal with some extraordinary situation. A small standing group with rotating membership could be available between plenary meetings to consult with the Director if necessary.

The establishment by governments of national verification machinery would be a useful complement to the creation of this international compliance organ. National machinery would provide the technical staff with a readily available point of contact, familiar with the history and technology of CBW. These points of contact could expedite action both in clarifying charges and in organizing fact-finding missions. Constant intercourse at this technical level could also serve an early-warning function and might on occasion help to discourage unwise actions at the political level, whether unfounded charges or actual violations of obligations.

Since it would be hoped and expected that only rarely would charges be made on which the technical staff would in fact act, most of its work would be preparatory in character. The staff could thus be quite small, counting on experts and laboratories not its own to supplement its "in-house" capabilities. Lists of such persons and facilities should of course be established and contact with them maintained. The staff should prepare standard operating procedures for various contingencies and activities, in line with the guidelines set out in its charter. These plans and procedures should be thoroughly discussed with national authorities (the points of contact above) so that no one will be surprised when a procedure is triggered. The virtually automatic character of such actions should reinforce the deterrence of violations which is the chief aim of such machinery.

CHEMICAL WARFARE: SOME EVENTS OF THE PAST YEAR AND THEIR IMPLICATIONS

Background paper by J.P. Perry Robinson

Note by Editor: Because of space limitation, Tables 1 and 2 and the noted references have had to be deleted. The full text and tables can be obtained on request to the author.

This paper reviews events of the past year for their bearing on CW disarmament in general and the agenda of the Ninth Workshop in particular. It is not optimistic. Over the years since 1959, when Pugwash initiated East-West discussion on chemical/biological warfare, I doubt whether the prospects for CW disarmament have ever seemed to be shrinking quite so fast.

The less promising the climate for our work, the more necessary does it become, provided we can find something constructive to do. People say the Pugwash CW Study Group has a confidence-building role, thinking presumably of the opportunity which the Group provides for detailed technical discussion across political divides, uninhibited by worries about diplomatical repercussions. If so, we must guard against our meetings becoming purely symbolic. It may be a matter for regret that we are not, after all, convening in Czechoslovakia; but Switzerland is no less suited to frank exchanges of view. I say all this by way of preface to what comes later. There are places in this paper where my choice of subject-matter and commentary on it may offend people. That of course was not my intention. I am putting forward personal views on topics which to me appear crucial. It is personal views, not institutional ones, that we are here to develop.

The negotiations

Three matters have dominated the CW scene this past year: (a) further, and more strident, allegations of CBW-Treaty violations; (b) accelerating moves in the West towards poison-gas rearmament, most evident in the actions taken by President

Reagan on 8th February; and (c) the unaccommodating stance adopted by the Soviet Union where it could - not only in Western perceptions - have been acting to allay the apprehensions about its CBW policies and programmes which the allegations have strengthened, and which are now driving the rearmament.

All of this is bound to impede the attempts of the CD in its 1982 session to add significantly to the progress registered in last year's reports from its Ad Hoc Working Group on Chemical Weapons under the chairmanship of Ambassador Lidgard of Sweden. Moreover, with the US-Soviet bilateral working group still in abeyance since July 1980, the burden of responsibility on the CD has increased. That responsibility may, at the same time, have been made harder to discharge because of the continued denial of a proper negotiating mandate for the ad hoc Working Group. As between the 1980-81 mandate:

> ...to define, through substantive examination, issues to be dealt with in the negotiations on...a multilateral convention on the complete and effective prohibition of the development, production and stockpiling of chemical weapons and on their destruction.

and the new 1982 mandate:

> ...to elaborate such a convention, taking into account all existing proposals and future initiatives, with the view to enabling the Committee to achieve agreement at the earliest date.

Where and what is the real difference? Given that it is the United States which is blocking resumption of the bilateral negotiations, the difference does not seem to be one at all commensurate with the declarations of commitment to CW arms control made last month both by President Reagan and by Defence Secretary Weinberger.

As to the details of what was achieved by the CD during 1981, these will be familiar enough to Workshop participants to need no summary here.

Western moves towards CW rearmament

The CD Ad Hoc Group will probably progress just as far this session under its new mandate as it could under any other, for Washington's present unwillingness to commit its representatives to actual negotiation has been plain to see. By way, evidently, of justification, there has just been a remarkable utterance by the US National Security Council putting forward the following view of the past bilateral CW talks:

> ...These efforts stalemated due principally to fundamental disagreement on the tough issue of the need for effective verification of a CW ban and particularly Soviet intransigence on questions relating to on-site inspections. Negotiations were further complicated by our weakness in this area compared to the Soviets, who possessed a decisive military advantage and had little arms control incentive in the face of the large asymmetry in chemical warfare capabilities. The Soviets did, however, have an interest in negotiations as long as it impeded improvement of US deterrent capabilities.

This stance is getting a mixed reception from America's allies, but it will at least prevent the fact of negotiations-in-progress being cited by domestic critics of American poison-gas rearmament - until such time as the rearmament can "provide incentive and gain leverage in arms control negotiations". There are, it must be assumed, people who really believe in this 'bargaining chip' strategy.

On 8th February 1982, President Reagan certified to the Congress that resumed production of poison-gas weapons was "essential to the national interest of the United States." The certification was done to satisfy legislation enacted in 1975 to preclude secret resumption. On the same day, the President's budget for fiscal year 1983 was submitted to the Congress. It included $123M for acquisition of new poison-gas

weapons, of which $30M were for actual production, the rest for continued R & D and for building the production base. As defence expenditures go, these are trivial amounts; but of course they represent only an early installment. If the production programme is to meet the stockpile requirement that has been stated by the Joint Chiefs of Staff, the total cost over the estimated 15 years to completion looks like being in the range $9,000M to $19,000M in 1982 dollars. The new weapons are to be the form of the binary munitions noted in Table 1. It will be seen from this table that much R & D has yet to be completed on the binaries. But the Reagan Adminstration is now funding this work at some fifteen times the level of the Carter Administration. The planned American rearmament effort is, in short, a major enterprise.

In addition to all this, the upgrade programme for US antichemical defences, which began in 1977, will continue. Allocation of a further $8,000M to this end is envisaged over the next 15 years. There is talk of spending more than a tenth of this sum over the next five years solely on R & D medical countermeasures against CW attack.

Other Western countries are also actively upgrading their antichemical defences. But with the exception of the Dutch Government, all other NATO governments are, for obvious reasons, reticent in public on the question of joining with the Americans in CW rearmament. Internal debates on the matter have been conducted, as is evident from the spate of articles in professional defence journals about desirable CW postures and related matters. It now looks as though the US Administration will be sparing its allies the embarrassment of complying with the Congress's directive last June to "provide a country-by-country report from our NATO allies with respect to their official views on that long-range programme", a report which the Congress stated it would need before further funding could be approved.

The Soviet CW stance

Testimony before Congressional committees this past year by senior US defence officials has continued to lay stress on the magnitude of the threat perceived in Soviet CW capabilities. "My judgement is that today we are in a disaster mode", said the Principal Deputy Under Secretary of Defence (Research and Engineering) in September 1981 to a House subcommittee, then going on to provide the subcommittee with the following table to illustrate his remark:

Soviet Advantages (USSR:US) - 1980

Chemical units	35:1 (under mobilization)
Chemical personnel	11:1 (under mobilization)
Decontamination vehicles	10:1 (under mobilization)
Chemical munitions	4:1 - 10:1 (exact quantities unknown)
Chemical weapon systems (ground)	5:1 (CW capable delivery systems)
Production facilities	14:1 (active/inactive)

Other officials have been providing other Congressional committees with this table.

The basic data underlying such comparisons have not been published, nor have the operative assumptions. If they were published, one would doubt whether the comparisons could survive serious scrutiny - not least in view of the testimony about the quality of the US intelligence available on Soviet CW given by the Secretary of Defence and the Director of the Defence Intelligence Agency before the Senate Armed Services Committee in September 1980. The point, however, is not that the current appraisals are wrong or misleadingly presented. For all anyone in the West and probably most people in the USSR and allied countries as well can tell, the appraisals may just as well be right as wrong. The point is rather that they are now believed so strongly in the West that they are rarely, if ever, questioned in public. With regard to their influence on the future of Western CW rearmament, their accuracy has thus become immaterial; key decision-makers are taking them seriously. The appraisals do indeed present Western defence authorities with grounds for grave concern, as Table 2 illustrates.

For as long as the present high degree of uncertainty about Soviet poison-gas persists, Western leaders obviously have no prudent option but to assume that the capability is a real menace. The Soviet Government, if it wanted to, could undoubtedly find ways for reducing the ambiguities attaching to its CW stance in Western eyes, and could surely do so without at the same time compromising Soviet security to the point of net disadvantage. But even though the need for such mistrust-reducing measures is so evidently growing, Moscow has not chosen to act in such a manner. This failure is becoming more and more conspicuous and damaging. For example, given the prominence which Tass, Radio Moscow, Soviet News, etc., have been according CW over the past year - mostly in connection with the allegations discussed below - it is remarkable that these organs have carried no declaration that the USSR, like the USA, has long been observing a de facto moratorium on chemical-weapons production.

Allegations of CBW-Treaty violation

The use of CBW weapons has been alleged in seven different conflicts this past year. Table 3 provides a summary. If true, the CBW arms-control regime established in international law is under grave threat.

Not one of the allegations has yet been definitely verified. In the case of those relating to Laos, Cambodia and, to a lesser extent, Afghanistan, an impressive body of circumstantial evidence has been published, but it remains fundamentally inconclusive. The UN Expert Investigating Group, established in December 1980 by a General Assembly vote of 78-17-36-22,* had its first report published in November 1981, and then, by a vote of 86-20-34-16,* had its mandate extended for another year. Its first report was an admirable piece of work, given the circumstances; but few can doubt that the Group will need all the goodwill and assistance it can get if its second report is to shed any clearer light on the allegations.

It remains to be seen whether the UN investigation will now take in more of the allegations than were addressed in last year's report. On the Afghan, Laotian and Cambodian allegations, most (though not all) of the evidence thus far available has come from the United States Government. The most startling of the US disclosures has been the identification of eposytrichothecene mycotoxins in environmental and other samples said to have come from reported toxic-attack sites in Cambrodia and Laos; a finding which, however, raises at least as many questions as it seems to answer. The finding has strongly polarized opinion on the truth of the allegations. There are those people who see nothing more than propaganda in the US Government releases: an attempt by Washington to inflame opinion against the Soviet Union for a variety of general and specific motives; a replay of the Cold War rhetoric heard when the United States was accused of using biological weapons during the Korean War. The strangely crude manner in which the State Department announced the mycotoxin analysis during September-November 1981 lent much support to this view. At the other pole are the people who are convinced by the sheer volume, variety and suggestiveness of the available evidence, and who regard those who criticise it and demand yet more as, at best, wilful obscurantists. They have little doubt that the Soviet Union and Viet Nam have been flouting the CBW arms-control regime, and they reject the repeated Soviet and Vietnamese denials.

The US Government has declared itself convinced by its evidence. It is now citing that evidence, together with reference to the Sverdlovsk anthrax affair, in public expressions of dissatisfaction with Soviet arms-control behaviour: a dissatisfaction which, it says, necessitates the greatest circumspection before entering into any more arms-control agreements with the USSR and, in the meanwhile, enhances the requirement for an upgraded CW deterrent/retaliatory capability. However, on the basis of what the US Government has so far disclosed of that evidence, there is little reason for anyone else to be convinced: too many alternative explanations of the published data remain open, and too may valid questions about the authenticity of the data remain unanswered, not all of them unanswerable. A short while ago, a full

*The figures for votes given represent consecutively, for, against, abstentions, absent.

National Intelligence Estimate of the reports emerged from the US governmental channel prescribed for such things, comprising, it is reported, a two-volume document of several hundred pages. In view of the extreme gravity of the affair, and in view also of the turmoils which its endorsement of the allegations has created, the US Government is under a clear obligation to publish as much of this document as it possibly can. The signs are that something is indeed being prepared for publication, maybe even with release by the end of this month.

As for the mycotoxin aspect, not all of the relevant data are controlled by the US Government. There is, for example, the physical sample acquired for later analysis by the UN Expert Group. Uncertainties about its provenance will, however, reduce its value as evidence one wav or the other. Again, there is the sample acquired by ABC Television in Thailand said to have originated in Laos. In its long documentary on the allegations broadcast on 21 December 1981, ABC described something of the analysis that it had commissioned of this sample, laying stress on the finding of polyethylene glycol. This had been found at 100-1000 ppm alongside three epoxytrichothecenes (DON, T2 and DAS), at about 50 ppm each, and zearalenone (another mycotoxin frequently found with epoxytrichothecenes among Fusarium metabolites), at 228 ppm. What the ABC documentary did not discuss was the finding of complete solubility of the sample in the solvents used for work-up: methanol by one of the analysts, and methanolic ethylene dichloride by another. The five substances positively identified and estimated in the sample accounted for well under 1500 ppm. So what constituted the other 99.8+ percent of the material that went into solution? Not trichothecenes, evidently, since these were what the analysts had been looking for. None of the sample remains. If we really are to believe that trichothecenes were the active agents in novel toxic weapons - and not, say, contaminants of something quite other - what are we to make of weapons so sparing in their use of toxic agent? Were these toxins as physiologically active as, say, dioxin or nerve gas or CS, there would at least be one explanation presenting itself; but they are not.

It is the implication of toxins which now makes this whole set of allegations weigh especially heavily on the future of arms control. The evidence for their involvement cannot be disregarded, but it is so bewildering as to defy rationale explanation. There are just too many loose ends.

Another loose end: In July 1964, the Cambodian Government complained to the UN Security Council that South Vietnamese aircraft overflying Rattanakiri Province had spread "yellow toxic powders" as a result of which 76 people had died.

Toxins

In July 1981, Czechoslovakia submitted a working paper on toxins to the CD. The paper discussed most cogently the problem of defining these substances in a scientificaly sound manner. It concluded that the only characteristic which the substances all had in common was a combination of organic origin and pronounced biological activity. Since it was not possible, therefore, to define them in purely chemical terms, their inclusion within the scope of the projected CW Convention would create a dangerous "grey area" of potential "misunderstandings, misinterpretations and endless queries". The paper reaffirmed the inclusion of all toxins within the scope of the 1972 BW Convention, and argued that any additional treaty restrictions on them would risk "undermining the reputation of the BW treaty".

This last point seems to me to warrant further discussion. The consideration raised in the Pugwash submission to the 1980 BW Convention Review Conference surely remains valid: that, in view of the incipient shift towards greater reliance on biotechnological processing by the civil chemical industry, the BW Convention may itself soon become afflicted by serious "grey area" problems. Therefore, far from weakening the BW Convention, inclusion of toxic biotechnological-process products - which are 'toxins' within our present understanding of the term - within the

scope of the projected CW Convention would actually strengthen it.

This consideration seems to me to have an increasing immediacy, for two reason. First, civil applications requiring large-scale manufacture are already being devised for toxins. One topical example is provided by Soviet Author's Certificate No: 528918 granted in December 1976 for a novel means of producing an epoxytrichothecene mycotoxin applicable as an antifungal agent. This toxin, trichothecin, is apparently used in the USSR in 1% dust formulations for aerial dissemination over crops and forests, and also as an agricultural rodenticide.

The second reason is that events of the past year almost certainly stimulated every major CW laboratory in the world that was not doing so already to evaluate or re-evaluate toxins as potential threat agents. Because of expanding industrial biotechnology, toxins earlier dismissed as too difficultly accessible may now be found to have serious candidacy as munition-fills.

Novel potential CW agents

During an interview published in Bild Zeitung on 25 June 1981, the Chairman of the Federal German Police Union stated that a new chemical weapon had been developed for police forces which could immobilize people for up to thirty minutes without harmful side effects: they were put out of action but left fully conscious.

Azabutadienes are being examined as potential training/riot-control agents.

Developments in veterinary drugs must certainly warrant attention in connection with the scope of the projected CW Convention. Conceivable and accessible applications in chemical warfare of substances such as the veterinary anaesthetic fentanyl are not difficult to envisage.

Nor should developments in criminal circles escape attention. According to a Reuter wire-story out of Moscow, two Georgians recently admitted to spraying a sleep-inducing chemical into a compartment of a railway carriage prior to robbing its occupants.

Proliferation of CW weapons

If true, the CW use allegations listed in Table 3 would mean a significant proliferation of poison-gas capabilities to countries not previously known to have possessed them.

Other allegations of proliferation have appeared recently in the press. A story in the New York Times states that Chile, prior to 1976, was said to have produced nerve gas for use if hostilities arose with Argentina and Peru.

A report of the US Joint Chiefs of Staff leaked to the press at the end of 1981 allegedly states that "even small powers like Vietnam and Pakistan appear to have chemical capabilities."

Demilitarization of chemical material

The US chemdemil programme is now advancing into the destruction of the BZ stockpile at Pine Bluff Arsenal. What was presumably an experimental demil* was reported last spring in preparation for a projected long-range BZ demil*programme.

A US chemdemil facility is to be constructed during the next few years on Johnston Atoll in the Pacific. Other than West Germany, Johnston Island is the only overseas storage location of US chemical-weapon stocks.

The US Defense Department now estimates that it would take 15-20 years to demilitarize its entire stockpile of chemical agents and munitions, "depending on the emphasis and support provided."

Conclusion

The American decision to advance the binary programme into full-scale production has received much adverse international publicity and will certainly attract a great deal more over the months and years ahead. The 'bargaining chip' strategy which the US Government is expounding in part justification of the programme is compromised

*Chemical demilitarization

by the Administration's seeming duplicity on the arms-control front: its declared policy avowing commitment, but its actual policy blocking negotiation; in public accusing the USSR of not negotiating seriously, but in private - in fora which the press and general public have limited access to and limited comprehension of - denying the USSR opportunities to negotiate seriously. This is a disturbing situation for America's friends, and does not augur well for CW disarmament.

My own personal view, however, is that an obstacle to progress much more pernicious than the American rearmament exists in the extraordinary uncertainty which prevails among Western and nonaligned countries alike as to the real nature of the Soviet CW posture. So sparse are the details available about it, and so ambiguous their import, that worst-case assumptions inevitably prevail. Even so, countries with a strong antichemical protective stance might still be prepared to take risks in negotiating a CW treaty with the USSR. But with the USSR now implicated in so many of the recent CBW-use allegations, unverified though they may be, and at the same time doing virtually nothing to allay apprehensions on this and other sources, those countries must be increasingly disinclined to take the negotiating risks.

Soviet secrecy is, one may think, a fact of life which nothing short of radical structural change is going to alter. And poorly substantiated calumniation is hardly likely to secure the cooperation of the Soviet Union on sensitive matters. We are thus at an impasse.

The way around it can lie only in strategies of confidence-building. These now need to be elaborated very quickly indeed if the whole CW disarmament enterprise is not to be overtaken by a full-scale chemical arms race.

A possible starting point would be reaffirmation by the US Government of its 1977-79 CW negotiating position and an expression of willingness by the Soviet Union to accept, as a CW Convention verification measure, the continuous presence of international observers at stockpile destruction operations.

TABLE 3

Alleged user, and occasion	Period	Weapons allegedly used
Location and Vietnamese forces in Laos	1974-1981	Mustard gas, irritants, nerve gas and mycotoxins spread by aircraft
South African forces during air attack on Kassinga, Angola	May 1978	'Paralyzing gas'
Vietnamese forces in Cambodia	1978-1981	Irritants, cyanide, tabun and mycotoxins spread by aircraft or artillery; poisoning of water
US covert action in Cuba	1978-1981	Causing outbreaks of sugar-cane rust, blue mound of tobacco, African swine fever and, in people, haemorrhagic dengue and haemorrhagic conjunctivitis
Vietnamese forces against Chinese invasion	February 1979	'Poison gas'
Chinese forces in Viet Nam	February 1979	'Toxic gas'; 'poisoning of drinking water sources'
Soviet forces in Afghanistan	1979-1981	Nerve gas, irritants, 'Blue-X' incapacitant and mycotoxins spread by aircraft and ground weapons; toxic bullets

Alleged user, and occasion	Period	Weapons allegedly used
Mujahideen in Afghanistan	1980-1981	'Lethal chemical grenades'
Ethiopian forces against Eritrean secessionists and in the conflict with Somalia	1980-1982	'Chemical warfare'; 'chemical spraying'; 'nerve gas'
Iraqi forces in Iran	November 1980	'Chemical bombs'
Salvadoran Army and National Guard in El Salvador	1981	'Toxic gas'; 'chemical bombs'; 'acid spray'
Thai artillery fire into Cambodia aircraft from Cambodia	February 1982	'Poisonous chemicals' causing vomiting spread by 105mm cannon
Attacks on Thai villages by aircraft from Cambodia	February 1982	Sprays of yellow material later found to be a mix of crushed flowers and fungus

CHEMICAL WEAPONS TODAY

(Editor's Note: The following is an abreviation of the background paper submitted by Professor Jorma Miettinen. The full text with references can be obtained from the author)

1. The Chemical Weapons Stockpiles today

Only three states are presently known to possess chemical weapons in Europe.

The United States is reported to have 6000-10 000 tons of chemical weapons (corresponding to 700-1100 tons of agent and between 100 000 to 300 000 munitions) in one ammunition depot in the Federal Republic of Germany. This was said to be located at Fischbach, about 100 km south-west of Frankfurt am Main, by a recent West-German TV documentary. The total US stockpiles of poison gas, mostly stockpiled in 8 arsenals in the Continental USA, is about 38 000 tons of agents. About half of it is nerve gas, the other half mustards. It seems that the present US administration has decided that the present stockpile is not sufficient for deterrence since it has decided to start the production of binary munitions as mentioned. The goal seems to be 7000 tons of agent serviceable weapons in the mid '80s and additional stockpiles in bulk storage, not counting possible future production (Senate Hearings, 1981.)

The Soviet Union according to US estimates, has something between 30 000 and 700 000 tons of chemical agents. The latter figure seems to me totally incredible. It evidently comes from summing up the estimated volumes of all such Soviet Army munition depot shelters which could held chemical weapons (but which can, in fact, contain anything else.) Even the often-cited mean of the above esitmate, 350 000 - naturally a totally artificial figure, too - is to me incredibly high. It would correspond to 3 million tons of chemical munitions which would be 50% more than the total of all types of munition in the US stockpiles.

It is regrettable that the Soviet Union has never given an official statement on its chemical weapons stockpiles. This is a greatly destabilizing factor leaving the observers to rely on US intelligence sources.

A West German estimate (L. Ruehl) is 200 000-700 000 tons of "theatre chemical weapons", which would correspond to ca. 20 000-70 000 tons of agents, i.e., about equivalent to the American stockpiles of CW agents. Since the Soviet Union lumps under chemical weapons also incendiaries, smoke and flame munitions, and its chemical defence materials include also those against biological and radiological effects, it is often difficult to know what is really what. However, it seems evident that all Warsaw Pact troops are well prepared for chemical warfare and the Soviet Union has sizable stockpiles of various chemical munitions. It also has a great variety of dual launchers and in its large scale manoeuvres in the 1960s chemical warfare played an important role.

France is the third country known to have a stockpile of chemical weapons evidently also including nerve gases. There is no reliable information on the amount of the French stockpiles: some sources say they amount to some hundreds of tons of nerve gases only, other sources up to one million VX munitions (at 3 kg VX/shell 3 000 tons of VX). The low estimate is mentioned, e.g., by J.P. Perry Robinson who also mentions that the French are now developing binary nerve gas technology at their SNPE facility near Toulouse. This speaks for the smaller stockpile estimate, since the French would hardly prepare for binary production if they would have large stockpiles of unitary VX. They do not have an overseas transporation problem and binary shells are only two thirds as efficient as unitary shells of the same volume of agent. One can get a rough idea of the military need by thinking that 500 guns would fire 100 munitions per day, 10% of them VX-shells, during 30 days. This would come to 150 000 shells, or ca. 500 tons of agent.

For the moment all these national stockpiles are justified for deterrence and retaliation only. Their other use would be illegal, on the basis of the Geneva Protocol of 1925, and, in view of the good level of protection provided for the armed forces of the two military blocs, of only marginal military efficiency in Europe.

The USA has decided to start a production of binary chemical weapons. If it wants to bring some of these to Europe it will encounter tremendous political difficulties. The Federal Republic of Germany cannot have any chemical weapons: its peace treaty forbids it and the Western European Union is in fact ensuring that it does not have any. Its ruling Social Democratic Party has decided against accepting any new chemical weapons on the soil of the FRG. The same is true of Holland, and public opinion in several other West European countries is also firmly against introduction of these new chemical weapons into their sovereign territories.

2. The agents of today

The chemical warfare agents in use today have been well described in the SIPRI monographs and I do not aim to dwell long on those known to be stockpiled, particularly by the Soviet Union and the USA. The World War I and II agents Chloropicrin, phosgene, diphosgene, HCN, adamsite and various mustards are said to be still stockpiled in the Soviet Union. It is also known to have two nerve gases, the non-persistent tabun and the semi-persistent soman in its stockpiles. The Soviet Union has a high level in scientific work on organophosphates since 1980. As for the persistent agent it is said to use a somewhat mysterious VR55, later identified as "thickened soman". It is believed to be soman with an addition of a slowly volatile solvent. Organophosphates like tributylphosphate are common, cheap industrial plasticizers and being readily soluble in soman might lend themselves to the purpose.

The United States is known to stockpile only two nerve gases, the non-persistent sarin (GB) and the persistent VX. There may exist some need for an intermediate volatility agent. Some countries are worried that the lavishly financed US research pipeline might have produced some new, even more potent nerve gases, but I doubt

that any definitely superior ones would have been discovered. The toxicity of GB and VX is quite sufficient and their field properties satisfactory. It is known that the USA uses these agents in its new binary programme. Field testing of new agents and training of all troops - also those of the NATO Allies - for their use would be a cumbersome, expensive and today even politically difficult process. Only radical improvements in agent properties could justify them and such are not likely in regard of organophosphates.

As for the non-lethal agents the US research pipeline seems to have produced (according to Congressional Hearings) two new agents of interest:

> EA 4923, a volatile irritant, probably a cycloheptatriene, and EA 3834, a follow-up agent for BZ which has been deleted as obsolete. The new agent is also a glycollate.

Another chapter is the "yellow rain", which according to the accusations of the USA is a crude extract of Fusarium mycotoxins, alleged to have been used in Laos, Kampuchea and even Afghanistan. While the compilation of refugee stories of the Laotian Hmongs is impressive, there seems to exist no hard evidence on the use of toxins in these countries. Descriptions on the collection of the few samples from Kampuchea, near the border of Thailand, is quite unsatisfactory, although the analyses themselves in which T_2, nivalenol and dihydronivalenol were identified, may be OK. The small concentrations found may be of natural origin or exist as impurities in the "yellow rain" sprayed.

It is regrettable that the USA which always stresses the importance of international verification does not follow the customary international standards in describing the origin and treatment of its verification samples from Kampuchea.

In any case these accusations seem to have greatly increased interest in mycotoxins in many research laboratories (including ours) and may also encourage search for new toxins to be used as CW agents in some countries in spite of the fact that such an activity is forbidden by the Biological Weapons Treaty. It is regrettable that there exists no precise agreed definition for toxins.

Whatever the truth regarding the recent reports from Indochina, they seem to suggest that these local wars may be providing training grounds for offensive chemical warfare and, possibly, for experimenting with new agents.

J. Miettinen

BOOK REVIEWS

Contemporary Terror: Studies in Sub-State Violence, edited by David Carlton and Carlo Schaerf, The Macmillan Press Ltd., London 1981, pp.227, £20.00.

The papers in this volume were presented to the seventh course of the International School on Disarmament and Research on Conflicts (ISODARCO), organized by the Italian Pugwash Group and held in Ariccia, Italy 18-27 August 1978. Many of the world's leading authorities on terrorism and sub-state violence are among the contributors to the book. These include J. Bowyer Bell, an authority on the IRA, Lillian Becker, author of Hitler's Children, Alessandro Silj who made a study of the Aldo Moro kidnapping and assassination, Yonah Alexander, Director of the Institute for Studies in International Terrorism, and Bernard Feld who writes about the possibility of nuclear weapons being obtained by terrorists. An excellent summary of the discussions is provided by William Gutteridge.

Some 55 participants, including many well known Pugwashites who attended as lecturers, took part in the meeting. The book is an authorative, original and timely addition to the literature on one of the major problems of modern society and which, of course, has a long political history.

M.M.K.

European Security, Nuclear Weapons and Public Confidence, edited by William Gutteridge, assisted by Marian Dobrosielski and Jorma Miettinen, The McMillan Press Ltd., London 1982, pp.236 £20.00.

The possible contributions of arms control to European security is an issue which has taken on new significance and urgency with the deterioration of US-Soviet relations since the late 1970's. Not only have we needed to consider precisely which steps could reinforce stability in Europe, we have also had to discuss the feasibility and propriety of serious arms control negotiations on any topic when the build-up of Soviet forces, developments in Afghanistan and Poland, accusations about the use of chemical weapons, and the planned deployment of Pershing II and Cruise Missiles in Europe, were causing major problems in East-West political relations.

Thus a book such as this, dealing with European security in wide terms, is clearly timely, especially as the chapter which gives most hard data on theatre nuclear forces by Brauch is relatively up-to-date. Miettinen's chapter on the immorality and the lack of military utility of the neutron bomb is of direct importance as the Reagan Administration has decided to produce such a weapon although it has not committed itself to deployment. Just as important, there has been no NATO decision on the neutron bomb.

But rather than dwell on individual contributions, three general qualities of the book should be noted. First, as the editor tells us in his Introduction, the book is largely based on conference contributions made in 1978 and 1979 and so usefully reflects the attitudes of the time. Second, the book treats neglected subjects - arms control in Northern Europe, and the resource and military significance of the Arctic and economic and technical cooperation in Europe. This latter section, for instance, includes an interesting piece on electric power cooperation by Botzian. Third, like most Pugwash volumes, the book brings together ideas and analyses from not only East and West but also from all parts of Europe. It is all too easy to forget how American intellects and publications tend to dominate arms control thinking. This book demonstrates that many others are thinking seriously about arms control and provides access to their ideas.

The book has two slightly disappointing features. Some of the contributions are too short for the authors to develop any depth of analysis. It would have been useful had the editor persuaded Martin Kaplan to expand his piece on European scientific and technological cooperation, an important topic with a small literature. Also, most of the contributions from the East reflect splendid critical faculties while the authors are looking out on to the West but few such when they are looking at themselves. We know from humour alone on the communist world that there is a real capacity for self-criticism. Yet is is difficult to develop a meaningful dialogue when one side insists, at least in public, that only one side has responsibility for the arms race.

Overall this book is a valuable contribution to the European arms control debate. Although expensive, it is very well produced and William Gutteridge is to be congratulated for his editing work; the English throughout is correct and clear, no mean achievement when so many of the contributors do not have English as their native language.

Trevor Taylor

OBITUARIES

Academician Frantisek Sorm of Czechoslovakia died on 18 November 1980, at the age of 67. He was Professor of Organic Chemistry of the Charles University in Prague since 1950, and was one of the first members of the Czechoslovak Academy of Sciences. Successively, he was scientific secretary, vice-president and then president of the Academy. He was distinguished in the field of chemistry of natural organic compounds, including steroids, organic synthesis, high-molecular systems and protein structure.

Academician Sorm was one of the most ardent supporters of the Pugwash Movement. He was President of the Czechoslovak Pugwash Committee since 1962, and hosted the 13th Pugwash Conference at Karlovy Vary in 1964, as well as two symposia and a series of Pugwash meetings on European Security and of the Biological Warfare Group, at Marianske Lazne during the sixties.

Academician Evgeni Fedorov of the Soviet Union died on 30 December 1981, at the age of 71. He was an outstanding figure, both as a scientist and as a statesman.

Fedorov was a geophycisist of world repute. He was a member of the famous expedition on the drift-ice station "North-Pole-1", which pioneered the research of the Arctic-Polar area. He initiated a number of research institutes in the USSR, including the Institute of Applied Geophysics and the Institute of Meterological Information. For a period of years he was the chief scientific secretary of the USSR Academy of Sciences.

Academician Fedorov was also very active in peace movements. He was the first chairman of the Anti-fascist Committee of Soviet Youth; in the later years he was Vice-President of the World Peace Council. He was a member of the Presidium of the USSR Supreme Soviet.

He was one of the earliest Pugwashites and participated in several of the first Pugwash Conferences. From 1958 to 1963 he was a member of the Pugwash Continuing Committee (as the Pugwash Council was then called).

Sir Rudolph Peters of the UK died on 19 January 1982, at the age of 92. He was a famous biochemist and for many years held the Chair of Biochemistry at the University of Oxford. Later he returned to Cambridge where he continued his research work and made important contributions to agriculture. He attended the Tenth Pugwash Conference in London.

Lord Ritchie-Calder of the UK died on 31 January 1982, at the age of 75. He started his career as a journalist, and for many years was Science Editor of the News Chronicle. But his field of activity was so wide, particularly in the popularization of science and in fostering good relations between nations, that - although without formal academic training - he was appointed Professor of International Relations at the University of Edinburgh, and later created a life peer. In this capacity, he enlivened the House of Lords with his interventions on science and problems of peace.

Ritchie-Calder was passionately devoted to peace and was a leader of the Campaign for Nuclear Disarmament. These interests brought him in contact with Pugwash; his last attendance was in the Workshop on "Averting Nuclear War: the Role of the Media" in October 1980.

CALENDAR FOR FUTURE MEETINGS

1982

18-21 May 1982	Symposium on "Nordic Initiatives for Arms Limitations in Europe", Oslo, Norway.
5-6 June 1982	Sixth Workshop on Nuclear Forces in Europe, Geneva, Switzerland
26-31 August 1982	32nd Pugwash Conference, "The Current Danger of Nuclear War: the Russell-Einstein Manifesto after 25 Years", Warsaw, Poland.
25-29 October 1982	Symposium on "An International Agency for the Use of Satellite Observation Data for Security Purposes", Versailles, France.
Early 1983 (tentative)	Symposium on "The Arms Race and International Law", Helsinki, Finland

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