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EDITOR'S NOTE

This issue of *Disarmament Forum* focuses on various aspects related to biological weapons. The BWC is now twenty-five years old. Although many of the world's well-developed biological weapon programmes have been dismantled, concern continues to rise about the illicit use of biological weapons by rogue states, non-state actors and terrorists.

With an eye on next year's Review Conference, this issue of *Disarmament Forum* is well in advance of the meeting—to give delegates and interested parties the opportunity to absorb the information contained herein. In this issue you will find an overview of where the BWC is going as well as where it has been—the historical context of this Review Conference, the spectrum of possible outcomes of the Protocol negotiations, speculation on rates of change in biotechnologies, and suggestions for strengthening the regime.

The first issue of *Disarmament Forum* in 2001 will address the missile defence debate. While missile defences have a long and controversial history, the attention they have attracted over the last few years is not about to abate. Can missile defences actually work as advertised? Are such active defences an appropriate response to real or purported missile threats? What are their implications for deterrence? Although these and similar questions have been raised in previous instalments of the missile defence debate (from the genesis of the ABM Treaty to GPALS via SDI), they now present themselves in a very different and complex international security environment and need revisiting. As an institute dedicated to disarmament research, UNIDIR's natural point of interest, and the underlying common theme to the articles in the forthcoming issue of *Disarmament Forum*, is the impact of missile defence plans, statements and deployments on prospects for arms control, non-proliferation and disarmament.

The summer period has been accompanied by many exciting changes and opportunities for growth at the Institute. First, UNIDIR is pleased to welcome Olivier Brenninkmeijer as the Coordinator of our newly expanded fellowship and internship programmes. A group of fellows from South Asia will be arriving later this year to work collectively on a project regarding regional security.

Second, UNIDIR's handbook of definitions of arms control, disarmament and security terms is now nearly finalized and is due to be published before the end of the year. In collaboration with VERTIC (Verification Training, Research and Information Centre), and with the support of the United States Department of State, UNIDIR is already planning a follow-on handbook, looking specifically at verification and confidence-building terminology.

The *Geneva Forum*, an initiative of the Quaker United Nations Office, the Geneva Graduate Institute of International Studies and UNIDIR, is an occasional venue for information and informal discussion among the diplomatic and research communities in Geneva. Now in its third year, the Geneva Forum is being expanded to increase the degree of networking among the academic, NGO

and diplomatic communities in Geneva. The enhanced Geneva Forum will bring together the three main sectors in Geneva—disarmament, human rights and humanitarian action—to discuss their mutual interest in security and disarmament issues and to further expand the thinking in these communities. This collaborative initiative is being funded by the Ford Foundation and it begins on 1 October.

The Costs of Disarmament project, started in 1999 and managed by Susan Willett, is proceeding well and has developed a new part focusing on a cost evaluation of implementing the Ottawa Convention (the Mine Ban Treaty). The Government of the United Kingdom as well as the United Nations Fund are generously supporting these projects.

Lastly, the Governments of Belgium and Sweden are the latest additions to our sponsors of UNIDIR's work on West Africa

Don't forget to keep an eye on our website, where you can find not only the latest issue of *Disarmament Forum* (before the printed copy comes off the press!) but also information about the structure of the Institute, descriptions of current projects and the first chapters of UNIDIR publications.

www.unog.ch/UNIDIR

Kerstin Vignard

SPECIAL COMMENT

January 2000 marked the fifth anniversary of the beginning of negotiations in the Ad Hoc Group (AHG). If one includes the VEREX exploratory negotiations, participating states have been engaged for eight years now in the process of trying to strengthen the Biological Weapons Convention. What has been a period of piecemeal negotiations for biological weapons arms control has established itself as a landmark era of treaties and treaty operationalization for other types of weapons of mass destruction.

Since the beginning of VEREX negotiations in 1992, we have witnessed first the successful endgame of the chemical weapons negotiations. In 1993, the signature of the Chemical Weapons Convention (CWC) took place. It was followed by the establishment of the Preparatory Commission to the Organisation for the Prohibition of Chemical Weapons (OPCW). After entry into force of the Convention in 1997, the OPCW itself was established. By now, intrusive verification activities carried out by a full-fledged organization have been accepted as part of the daily routine in chemical weapons arms control.

With regard to nuclear weapons, the same period was highlighted first by the indefinite extension in 1995 of the Non-Proliferation Treaty (NPT). Then 1996 was marked by the conclusion of the Comprehensive Nuclear Test-Ban Treaty (CTBT). The CTBT Preparatory Commission is now in the process of building up an unprecedented global verification mechanism. Furthermore, a new set of qualitative verification measures was adopted in 1997 in the framework of the International Atomic Energy Agency (IAEA). By now, more than one-third of the member states of the Agency have signed or ratified the Additional Protocol.

One could ask the question: should there be such a discrepancy between progress in biological weapons arms control and progress in the control of other weapons of mass destruction?

Biological weapons-related events definitely have not justified complacency with such an unbalanced course of developments. Admissions in the 1990s of former offensive biological weapons programmes, as well as terrorist attempts that have fortunately failed, have created legitimate concerns within the world community. Those events have exposed even further biological weapons as second-to-none weapons of mass destruction, and, at the same time, the biological weapons prohibition regime as the weakest link in the system of prohibition regimes.

Developments in other areas of the biological weapons prohibition regime, such as defense, preparedness, non-proliferation and counter-terrorism, have not removed the *raison d'être* for an arms control verification arrangement. On the contrary, the understandable limitations of those separate efforts prove that, although multilateral arms control or a legally binding verification protocol is no panacea in itself, it can play a useful, synergistic and cost-effective role in the prohibition regime.

The development and adoption of a verification protocol would in itself demonstrate the determination of the international community to raise further legal, political and moral barriers against biological weapons and non-compliance with the Biological Weapons Convention. Additionally, the verification protocol would provide a value-added feature to other areas of the prohibition regime.

The recent difficulties for arms control and disarmament are further emphasizing the urgent need for the conclusion of the negotiations. As the single on-going multilateral disarmament negotiations, the AHG's work is the one and only codification effort that can send a positive message. It would take any other negotiations three to five years to reach a similar level of end-game maturity and ability to make a positive difference. The Protocol is the sole source of reinforcement to the faith in the co-operative multilateral management of security challenges.

Since its 1995 beginning, nearly twelve months have been spent on negotiations in the AHG. In the course of that time span, the group has covered different stages of negotiations. In July 1997, after the main building blocks of the Protocol had been identified, work started on the basis of a rolling text. Subsequent negotiations resulted in a well-structured and fleshed out rolling text by the end of 1998. Having nearly 3,200 brackets in the rolling text at that time, one could claim that differences were too well articulated. From January 1999, in the course of just five sessions, negotiators have managed, with an exceptional rebounding effort, to cut the forest of brackets in half, bringing it extremely close to a draft ready for final consolidation.

Beyond the rolling text, other ingredients for the successful conclusion of the negotiations seem to be available as well. They have to be brought together, and made to work together, by this AHG.

A major political ingredient for the concluding stage is the clearly articulated determination of the states parties to bring the negotiations to an end before the 2001 Review Conference. Such a political expectation was recorded in the Final Document of the 1996 Review Conference, and confirmed later in a series of bi- and multilateral high-level communiqués, including that of the September 1998 Ministerial Meeting in New York. There is a need to act upon the 1996 consensus expectation, which mandates the AHG to conclude the negotiations at any time before the 2001 Review Conference. As all states parties agree that the Protocol is an important objective for the international community, and the deadline is approaching, negotiators should move forward as quickly as possible, but without losing sight of the importance of producing a legal product of high quality.

Time, the scarcest arms control commodity, is available as well. Although the three months scheduled for negotiations in 2000 are shorter than the time spent in the final stages of the CWC and CTBT negotiations, they may still be sufficient to reach a critical mass in the negotiations. An encouraging sign in this respect is the dedication of delegations to negotiate in earnest, which might significantly compensate for shortage of negotiating time.

No political impetus or extra negotiating time will bring negotiations to a successful conclusion without substantive problems being addressed in a meaningful way. Issues are complex within their narrow context. But complications are geometrically increased by the intimate link different states parties attach to interrelated issues, such as compliance measures, list and criteria and scientific-technical co-operation. In general, it is never too early to try to untangle complicated clusters of problems in the negotiations. We should not be misled by the comforting inertia of brackets, believing either in their eternity or that later somehow they will disappear of their own accord. Joint compromise efforts by all, and in all areas, are needed from now until the very end of the negotiations to bring these negotiations to an early conclusion.

The first year of new millennium, similar to the previous year, is full of the anniversaries and political symbolism so important in multilateral diplomacy. March 2000 marked the twenty-fifth anniversary of the entry into force of the Biological Weapons Convention, the cornerstone disarmament instrument that the AHG negotiations are intended to strengthen. June 2000 marked the seventy-fifth anniversary of the 1925 Geneva Protocol, precursor to the BWC. In 1999 we commemorated the 100th anniversary of the First Hague Convention of 1899, which is a forerunner of the 1925 Geneva Protocol. An even further step back in the history of humanitarian law is the Declaration of St. Petersburg of 1868, the predecessor of the Hague Convention. Its contracting parties “reserved to themselves the right to come to an understanding, whenever a precise proposition should be drawn up, to reconcile the necessities of war with the laws of humanity”. Diplomats and politicians have attempted again and again over the last 130 years to achieve that ambitious goal. Advancement in their successive arms control and disarmament efforts turned out to be difficult and non-linear. Our historical predecessors many times failed to design the right scheme or reach agreement on it. But more frequently perseverance paid off, and they prevailed. Today I would like to pay tribute to the tireless efforts to accomplish, by common accord, such an ultimate reconciliation, where “the necessities of war ought to yield to the demands of humanity”. I wish the negotiators all the success they, and all of us, need in this endeavour.

János Martonyi

Minister for Foreign Affairs of Hungary

Abbreviated version of a statement of delivered at the nineteenth session of the Ad Hoc Group

The Proliferation of Biological Weapons: A Threat Assessment

Jean Pascal ZANDERS

Proliferation refers to the process of diffusion of weaponry and technology. Because of the 1925 Geneva Protocol banning the use of chemical and biological weapons (CBW) and the 1972 Biological and Toxin Weapons Convention (BTWC) most countries will not admit to having an active, dormant or even a past offensive biological weapon (BW) programme. Furthermore, the lack of in-depth case studies limits the understanding of how countries may set up BW armament programmes. The paucity of verifiable public information means that the BW proliferation debate will mainly rely on official statements or leaked information from intelligence agencies. Only a few states make such information more or less systematically available and they do so for domestic politics or in pursuit of certain international security interests.

These factors complicate the independent appraisal of the claims and the assessment methods. The absence of a definition of 'proliferation' in most analyses compounds the problem further. Consequently, there is no common understanding on when a country should be considered a proliferant state. Is a country a proliferator if it has the scientific, technological and industrial base to manufacture BW? Is the presence of a research and development programme the key indicator? Or, must a state be producing, stockpiling or deploying BW with military units to be a proliferator? The threat assessment is also negatively influenced by the perception of the enemy. Indicators that support pre-existing convictions will easily be included in the appraisal while counter-indicators will often be discarded as distracting from the true intent of that country. Factors that are objectively unrelated to the question of whether a country is acquiring a particular type of weaponry will feature in the proliferation assessment.

The burden of judgement lies with the proliferation analyst, who, invariably, will be influenced by his own social and cultural background. Different analysts may have different interpretations of the phenomenon and, therefore, value certain criteria differently. Intelligence or other governmental agencies of some countries often release lists of proliferators that vary in the names of states or in the judgement of the status of the programmes. Such variations also occur between the agencies of a single country. In summary, the lack of a definition of proliferation and corresponding assessment criteria means that no consensus can exist of when proliferation has occurred or when proliferation starts to pose a risk to international security.

Apart from these heuristic considerations, careful attention must also be paid to the source and quality of information. In proliferation studies, certainty of a BW programme will exist in only few cases: a country may publicly declare such programmes; physical evidence of such programmes, such as production and storage facilities or casualties from an incident, may be available; or

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international on-site inspections, such as activities by the United Nations Special Commission (UNSCOM) in Iraq, may confirm allegations. Even so, the certainty of a programme or a stockpile does not necessarily reveal anything about capability (which, in turn, depends on the definition of capability).¹ For example, the Japanese cult Aum Shinrikyo, which was responsible for the 1995 nerve agent attack in Tokyo, was developing biological agents for terrorist use, but never achieved the capability to disseminate them on a large scale.

This paper presents a brief history of BW proliferation and an overview of the current proliferation assessments. Three cases are described in more detail: Russia, Iraq and the proliferation threat of sub-state actors. Each case study is followed by a discussion of the impact on the BTWC and how the future protocol might resolve the issue. The final section deals with one of the greatest challenges to the future BTWC regime: the massive transfer of civilian technology to military applications in the case of a serious security crisis.

A historical overview

Several references to early forms of biological warfare exist, such as dipping arrows in putrefied flesh, infecting wells with decomposing corpses, catapulting cadavers over town walls or giving infected blankets from hospitals to indigenous tribe members. Biological warfare in its current understanding began in the First World War. Germany attempted sabotage with pathogens against livestock in the United States destined for Europe and the Middle East and considered similar acts in Central Europe. A better understanding of disease transmission in the 1920s and 1930s and the dramatic experiences of the Spanish Flu epidemic at the end of the First World War increased concerns about biological warfare. Based on essentially faulty intelligence about the intentions of other states and fears of vulnerability, several countries began to look seriously at the feasibility of biological warfare. Germany's research and development remained splintered throughout the Second World War and did not lead to a useful weapon. More concerted efforts in Canada, the United Kingdom and the United States led to the three countries pooling their resources in the early 1940s. Despite huge investments of resources, the Allies failed to produce an operational offensive biological weapon, apart from a limited British capability to retaliate with anthrax against German cattle. Japan's biological weapon programme began in the early 1930s and lasted until the end of the war. Yet, despite the human experiments and the tests during military operations in China and against Soviet troops, the Japanese had made no more progress than the Allies, as the United States learned after granting the head of the BW programme immunity from prosecution for war crimes.²

While post-war research and production of offensive BW continued in the Soviet Union and the United States, most secondary powers gradually abandoned their offensive BW programmes to formally concentrate on defence, protection and prophylaxis. Until the end of the Cold War few countries other than those that had begun BW-related investigations during the inter-war years were known to have started new biological warfare programmes. However, several of these countries are located in the highly volatile Middle East. The BTWC reflected the belief expressed by American President Richard Nixon in 1969 that BW are of very limited military value.

A major anthrax outbreak near Sverdlovsk (now Yekaterinburg) in 1979 as a consequence of an accidental release from a nearby military laboratory suggested that the Soviet Union, despite being a co-depository of the BTWC, was continuing an offensive BW programme. Persistent American allegations during the 1980s that Soviet troops in Afghanistan and Soviet proxies in South-East Asia were waging biological warfare exposed the intrinsic weaknesses of the BTWC and raised concerns about BW proliferation. Subsequently, several countries began to be identified as BW proliferators.

It nevertheless came as a major shock in the 1990s when the international community learned of the extent of Iraq's offensive BW programme. Moreover, the elaborate efforts to conceal its BW programme from UNSCOM inspectors and the willingness to endure international sanctions and military punishment testify to the importance the Iraqi leadership attaches to BW.

The investigations into the activities of Aum Shinrikyo uncovered the cult's interest in biological warfare agents. Although it never managed to produce a viable agent, the discovery fuelled the fear of sub-state proliferation and biological terrorism.

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Today's concerns

The United States is the main source of public information on proliferation developments. In 1997, American proliferation analyses converged on a figure of 'at least twenty countries' that 'already have or may be developing nuclear, biological, or chemical weapons, or their missile delivery systems'.³ The next year, however, the figure had risen to twenty-five.⁴ According to the Russian Federation Foreign Intelligence Service (Sluzhba Vneshney Razvedki, SVR) twenty-five countries, many of which are found close to Russia's borders, have or are developing various types of non-conventional weaponry.⁵ As these figures comprise four categories of weaponry, isolating the BW threat assessment is impossible. In the only known statement in 1998 by an American government official in which the figure did not encompass nuclear weapons, Deputy Secretary of Defense, John J. Hamre noted that 'At least two dozen nations already possess chemical and biological weapons or have active development programs to build them.'⁶

In 1997 the American Department of Defense listed seven countries as having a BW programme in various stages of development in its proliferation report: China, India, Iran, Iraq, North Korea, Pakistan and Russia.⁷ Libya was said to lack the scientific and technical base for a BW programme. Syria was believed to possess the biotechnical infrastructure to support a BW programme. However, compared to an earlier assessment four countries were conspicuously absent, namely, Egypt, Israel, Taiwan and South Korea.⁸ In 1999 the American Central Intelligence Agency (CIA) and the Arms Control and Disarmament Agency (ACDA) claimed that up to twelve countries are pursuing offensive BW programmes. The following states are said to have an offensive BW capability or are in the process of seeking such a capability: China, Egypt, Iran, Iraq, Libya, Russia and Syria. North Korea may be able to wage biological warfare, Sudan may be interested in BW, and there is insufficient evidence to determine whether Taiwan is developing activities prohibited under the BTWC.⁹

The variations in the lists indicate the uncertainties involved in naming suspected BW proliferators. Determining the status of the BW programme for an individual proliferant state is even more complicated for an outside analyst: the descriptions range from 'possessing the biotechnical infrastructure', 'various stages of development' and 'in the process of seeking such a capability' to having 'an offensive BW capability'. Once the future protocol to the BTWC will have entered into force it will be an important task to resolve these uncertainties and allegations. However, it will be equally important to publish the core information regarding the past and present compliance with the BTWC regime in order to generate confidence among the state parties. Excessive secrecy, as is currently the practice with the 1993 Chemical Weapons Convention (CWC), may actually undermine the value of the BTWC as a security regime as wild proliferation allegations go unchallenged.

The next three sections deal with concrete cases of proliferation, namely Russia, Iraq and sub-state proliferation, and discuss how they may affect the future BTWC regime.

CONTINUING CONCERNS ABOUT RUSSIA

Doubts about the termination of Russia's BW programme, as decreed by then President Boris Yeltsin in April 1992, persist. Factors that may contribute to a continuation of the offensive BW programme include institutional and bureaucratic interests, the enduring social and economic crisis, a further deterioration of relations with the West and with Russia's neighbours, a continuing focus on the reestablishment of Russia's status as a superpower, and the prospect of an inefficient protocol to the BTWC.¹⁰

The dire social and professional conditions in which the former Russian BW specialists currently live significantly increase the risk of a 'brain drain' to countries that may be interested in acquiring BW. Since Yeltsin's 1992 decree the BW-related establishments have laid off large numbers of personnel, while the remaining staff work under spartan conditions and often go without pay for long periods.¹¹ The feared mass exodus of BW scientists and technicians does not appear to have materialized, although some BW specialists are known to have sought contracts abroad.¹² Russia has nevertheless tried to prevent proliferation with new legislation. In January 1998 then Prime Minister Viktor Chernomyrdin issued a directive which prohibits Russians from engaging in foreign economic activities concerning goods and services potentially applicable for nuclear, biological and chemical (NBC) weapons or missile delivery systems.¹³ In May 1998 the Russian Federal Currency and Export Control Service issued a procedural explanation of the functioning of the export control system created by the federal directive. Today, President Putin may be prepared to bring Russia within full compliance of the BTWC and allow a greater degree of transparency regarding activities of relevance to the convention. This may be a part of a broader strategy to harness international support for his arms control objectives — especially regarding nuclear weapons and ballistic missile defences — and secure the non-interference in Russia's internal conflicts.

Through the Comprehensive Threat Reduction (CTR) programme the United States attempts to defuse the BW threat from the former Soviet Union. The former Soviet BW facility in Stepnogorsk, Kazakhstan, is being dismantled with American assistance. It was used to produce weapons for an offensive biological warfare programme, including production of resistant strains of anthrax.¹⁴ Work was expected to be completed by July 2000, but is still continuing at the time of writing.¹⁵

Originally primarily designed to eliminate Soviet and American chemical weapons (CW), the CWC—now in its fourth year of operation — has developed into a remarkably co-operative regime. The Technical Secretariat of the Organisation for the Prohibition of Chemical Weapons (OPCW) is helping states parties to be in the fullest possible compliance. Regional fora and bilateral interaction support this co-operative approach. There is an important lesson to be learned for the future BTWC protocol, whose verification requirements are still being defined by Cold War standards. Allowing for a broader scope of co-operation — bilateral, regional, or via the envisaged organization for the prohibition of BW — may be the most effective remedy against future proliferation. The multiple interactions on the level of governments, institutes and individuals — in addition to the more traditional verification and monitoring mechanisms — will enhance transparency regarding relevant activities. Russia's participation in the CWC has led to a growing number of industrialized states offering financial and technical assistance for the destruction of its CW stockpile. The conclusion of the protocol to the BTWC and Russia's early participation may stimulate similar assistance and thereby reduce the potential for proliferation from Russia significantly. Similar assistance programmes should be offered to other states (of concern) as an incentive to join the protocol (and the BTWC, if need be).

THE IRAQI CONUNDRUM

After the 1991 Gulf War the United Nations Security Council adopted Resolution 687 on 3 April 1991, which among other things created UNSCOM. This body had two basic functions: to inspect and oversee the destruction or elimination of Iraq's CBW and ballistic missile capabilities; and to monitor Iraq over the longer term to ensure its continued compliance with the obligations of Resolution 687.¹⁶ In 1999 UNSCOM was disbanded following a period in which Iraq systematically obstructed UNSCOM inspections and exploited the political disagreement among the permanent members of the UN Security Council to its advantage. On 17 December 1999 the Security Council adopted Resolution 1284 which replaced UNSCOM with the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC). At the time of writing (July 2000) UNMOVIC has not yet been able to carry out any of its tasks inside Iraq and even when it will be allowed to enter the country it remains uncertain whether UNMOVIC will be more successful than UNSCOM.

The accounting of Iraq's BW-related activities remains incomplete. Within its first year of operations UNSCOM found evidence that Iraq's initial declarations about a small BW research programme were incorrect and incomplete. It continued to uncover details, but it was not until Iraq was forced to admit that it had an offensive BW programme, which included the production of biological warfare agents, in July 1995 and the defection of Lieutenant General Hussein Kamal the next month that the extent of the Iraqi BW programme was fully appreciated. The Iraqi concealment efforts nonetheless continued. In 1998 further evidence was found that Iraq had weaponized biological warfare agents, including the filling of warheads for the Scud ballistic missile. Table 1 summarizes Iraq's BW declarations and UNSCOM's findings and estimates of weaponry and equipment unaccounted for based on UNSCOM's January 1999 report.¹⁷

The UNSCOM experience has revealed two troubling issues with respect to the future BTWC regime. First, the UN Security Council has so far been unable or unwilling to deal with Iraq's systematic violations of its own resolutions because some members succumbed to short-term interests. As few cases will be as clear-cut as that of Iraq, this raises serious doubts about the ability or willingness of the UN Security Council to uphold fundamental norms in the name of the international community when confronted by a determined and persistent violator. For major disarmament treaties, such as the BTWC and CWC, the Security Council is the ultimate arbiter in the case of material breaches.

Second, under UN Security Council Resolution 687 Iraq was forced to become a state party to the BTWC. States normally voluntarily engage in an international agreement and the legal consequences of this move have not yet been the subject of much learned debate. Nevertheless, since 1991 one state party is in continuous material breach of the BTWC. This material breach does not concern as much the presence of a BW programme before the Gulf War (which under the 1969 Vienna Convention on the Law of Treaties Iraq should not have had as a signatory state to the BTWC), as it does Iraq's persistent concealment efforts and the concomitant refusal to destroy all its BW and related installations and equipment after becoming a full party to the BTWC. None of the other states parties have taken up this condition in order to restore treaty compliance under Article VI of the BTWC (which allows a state party to lodge a complaint with the UN Security Council) or

As few cases will be as clear-cut as that of Iraq, this raises serious doubts about the ability or willingness of the UN Security Council to uphold fundamental norms in the name of the international community when confronted by a determined and persistent violator. For major disarmament treaties, such as the BTWC and CWC, the Security Council is the ultimate arbiter in the case of material breaches.

Table 1.

Type of weapon or equipment	Declarations by Iraq		UNSCOM findings ¹
	Amounts declared in FFCDs	Material balances	Assessment of Iraqi declarations
Al-Hussein missile warheads (BW)	25	All destroyed unilaterally.	Not supported by conclusive evidence; analysis of samples from excavated remnants of warhead containers does not support the FFCDs; the locations of these remnants are inconsistent with the FFCDs; consequently, there are major doubts about the accounts of weapon fillings, deployment and subsequent destruction.
Warhead fillings: ²			
- Botulinum toxin	16		
- Anthrax spores	5		
- Aflatoxin	4		
R-400 aerial bombs (BW)	200	157 filled and 43 unfilled bombs were destroyed unilaterally.	The R-400 declaration was changed several times; the account in the 1997 FFCD was both incomplete and inaccurate according to review by international experts; only partial verification of the destruction of the bombs.
Bomb fillings:			
- Botulinum toxin	100		
- Anthrax spores	50		
- Aflatoxin	7		
Aircraft drop tanks (Iraq was also developed; drop tanks may have been modified; a pilotless aircraft to carry the drop tank.)	4	1 destroyed in the 1991 air campaign; 3 destroyed unilaterally by Iraq.	No validation of data in Iraq's declarations; 12 more destroyed in the war.
Aerosol generators	The June 1996 FFCD includes a description of the devices, but does not state the number produced. The production of 12 aerosol generators was acknowledged in interviews with Iraqi personnel.	No Iraqi declaration about disposal.	The generators have not been accounted for.
Mobile storage tanks for agents	47	Unknown number destroyed; no specification whether unilaterally or in Gulf War.	Remnants of approximately 22 destroyed tanks have been turned over to UNSCOM; the remnants of 2 other tanks have been found; the rest remains unaccounted for.
Bulk Botulinum toxin ³	19,180 litres	10,820 litres were filled in missile warheads and bombs; 499–569 litres were used in field trials; 118 litres were wasted during handling; 7,665–7,735 litres were destroyed unilaterally.	Iraq's statements are unsupported; inability to verify the amount of Botulinum toxin produced; inability to verify Iraq's material balance.
Bulk Anthrax spores	8,445 litres ⁴	4,975 litres were filled in missile warheads and bombs; 52.5 litres were wasted during handling; 3,412 litres were destroyed unilaterally.	The statements in the 1997 FFCD are unsupported; inability to verify the amount of Anthrax produced; inability to verify Iraq's material balance.

Bulk Aflatoxin	2,200 litres	1,120 litres were filled in missile warheads and bombs; 231–301 were used in field trials; 30.5 litres were wasted during handling; 900–970 litres were destroyed unilaterally.	The statements in the 1997 FFCD are unsupported; inability to verify the amount of Aflatoxin produced; inability to verify Iraq's material balance.
Bulk <i>Clostridium perfringens</i>	340 litres	338 litres were destroyed unilaterally.	Neither figure could be verified.
Bulk Ricin	10 litres (produced from 100kg of castor beans)	All used in field trials.	Neither figure could be verified.
Bulk Wheat cover smut	Not quantifiable	All unilaterally destroyed.	Neither declaration could be verified.
Growth media		General inability to verify the figures. ⁵	
Casein	17,554kg	7,074kg were used in botulinum toxin production; 145kg were lost or wasted; 10,335kg were destroyed under UNSCOM supervision.	Minimum of 460kg unaccounted for based on UNSCOM importation data.
Thioglycollate broth	6,036kg	4,130kg were used in botulinum toxin production. 58 kg were lost or wasted. 1,848 kg were destroyed under UNSCOM supervision.	Minimum of 80kg unaccounted for based on UNSCOM importation data.
Yeast extract	7,070kg	1,964 kg were used in botulinum toxin, anthrax and <i>clostridium perfringens</i> production; 15kg were lost or wasted; 4,942kg were destroyed under UNSCOM supervision.	Minimum of 520kg unaccounted for based on UNSCOM importation data.
Peptone	1,500kg	45kg were used in <i>clostridium perfringens</i> production; 705kg were lost or wasted; 625kg were destroyed under UNSCOM supervision.	Minimum of 1,100kg unaccounted for based on UNSCOM importation data.

FFCD Full, Final and Complete Disclosure

1. All declarations by Iraq in the FFCDs were repeatedly rejected by UNSCOM and several panels of international experts (September 1997, March 1998 and July 1998).
2. Iraq changed its declaration in a statement to UNSCOM in July 1998: Botulinum toxin: 5; Anthrax spores: 16; and Aflatoxin: 4. UNSCOM Report, UN doc. S/1999/94 of 29 January 1999, Appendix 3, section 'Al-Hussein missile warheads'.
3. UNSCOM data only gave the volume of bulk agents, but not the concentration of the agent in the mix. It is therefore impossible to give the approximate weight of the biological warfare agents.
4. Based on statements by Iraqi officials, UNSCOM inspectors calculated the following conversion equation for the anthrax bombs: 100 litres of filling equals 140kg (density = ± 1.4), containing 1.2% of dried Anthrax spores. Per 100 litres there would thus be 1.68kg of agent. T. Trevan, *Saddam's Secrets: The Hunt for Iraq's Hidden Weapons*, London, Harper Collins, 1999, p. 318. Based on this equation Iraq may have produced approximately 141.9kg of anthrax spores.
5. Iraq did not report all the growth media UNSCOM knows it has imported. The figures on growth media used in the production of biological warfare agents are derived from estimates of how much agent was produced. According to the January 1999 UNSCOM report, these figures are the result of a theoretical calculation and have little supporting evidence. There are also substantial uncertainties about the amounts declared as lost or wasted.

through the procedure of convening a formal consultative meeting of states parties under Article V.¹⁸ They probably felt that the UN Security Council was already addressing the issue through UNSCOM. However, UNSCOM had in effect become inoperational since the summer of 1998 and formally ceased to exist in December 1999. The fact that Iraq remains in material breach of the BTWC has still not been formally addressed in the context of the BTWC.

SUB-STATE PROLIFERATION THREATS

In 1994 and 1995 the Japanese religious cult Aum Shinrikyo carried out two attacks with the nerve agent sarin. Police investigations into the cult's activities showed that it had also been investigating pathogens and toxins and had attempted several times to release them, apparently with no effect. As a consequence of these events, the threat projections of terrorism with CBW were no longer hypothetical scenarios. Since then most studies have focussed on the potential consequences of such future attacks: relatively small amounts of chemical or biological warfare agents are claimed to be able to produce huge numbers of casualties — according to some estimates, hundreds of thousands. However, the reasons why the Aum Shinrikyo sarin attacks produced relatively few casualties, why the cult was unable to produce a viable biological warfare agent or why such events did not occur earlier are currently not or only unsatisfactorily explained.

Theoretically, some military-grade agents can produce large numbers of fatalities and casualties. The processes for manufacturing and disseminating the most lethal and complex biological warfare agents in sufficient quantities to obtain such effects are nonetheless complex. Despite large investments, Aum Shinrikyo's BW programme experienced considerable problems. Three factors in particular contributed to this outcome. First, the people in charge of the programme may have been bright and skilled university graduates, but the support staff in the laboratories consisted of unskilled cult members who had been selected on the basis of their loyalty in order to reduce the risk of information leaks. Their inexperience negatively affected the quality of the research and development. Second, the cult lacked functional specialization: the people responsible for the research on the pathogens and toxins were also responsible for designing the laboratories and dissemination devices and were in charge of the agent production, the preparation and execution of the terrorist operations in Tokyo, and so on. No single person can combine all these qualifications. Third, the programme was dependent on external sources of supply, and it had to be conducted in secrecy because, unlike a state seeking BW, a terrorist organization does not enjoy freedom from prosecution. These factors, taken together, considerably complicate the acquisition of such weaponry.¹⁹

A scenario published in the SIPRI Yearbook 2000 describes how a cult disseminates anthrax over a busy shopping centre. The agent is of a type and quantity similar to that which was accidentally released from a military microbiology facility in Sverdlovsk in 1979.²⁰ Given realistic conditions, about 20–30,000 persons could be exposed to the cloud of spores. However, only around 300 people concentrated in a relatively narrow area would be infected but not necessarily killed. This contrasts with the many predictions that such use would result in mass casualties over large areas.²¹ In reality, such an incident would nevertheless place a heavy burden on the authorities in terms of medical response and decontamination. Yet, if they were prepared to treat the approximately 30,000 exposed people with antibiotics within a few days after the incident the consequences would be limited. Without any medical treatment most of the 300 infected people would die. Different environmental conditions (e.g., in a large sports stadium an estimated 1,500 out of 30,000 people present would acquire an infective dose) or the choice of a highly contagious agent would place different strains on the response services.

Governments face a multitude of biological terrorism threats, but the most catastrophic scenarios involving mass casualties, though possible, are not likely to occur. (Catastrophic scenarios involving non-conventional weapons, which feature in many policy debates, are often made plausible by insistence on the existence of a threat posed by state-sponsored terrorism.) Nevertheless, because of the potential consequences for the targeted society of a terrorist attack with BW, governments must be prepared for such an attack. The key issue is thus to devise and execute balanced policies. Overreaction can lead to countrywide anxiety and paranoia. In such an atmosphere, hoaxes may become as efficient — especially in terms of economic terrorism — as actual attacks with BW.

The future protocol can assist in preventing and deterring terrorism with BW by requiring states parties to adopt penal legislation affecting all stages of the BW armament process. It can also explicitly offer emergency assistance in case a state party becomes the victim of such an attack (the CWC does not include a specific provision to this effect because the Japanese sarin attacks occurred after the conclusion of the negotiation, but it is widely accepted that a state party can request the OPCW for assistance in such an event). Measures enabling states parties to upgrade their domestic response capabilities if they so desire could also be included in the future protocol as an additional incentive to join.

Future concerns

Proliferation studies principally focus on the transfer patterns of tangible objects, such as agents and equipment, and the threat of the immediate realization of the dual-use potential of these objects, whereby certain countries (or sub-state actors) of concern acquire technology developed for civilian use and instantly apply it for the purpose of acquiring BW. Yet, at the core of the biotechnological revolution is information: data collection and processing, knowledge, techniques and skills. Moreover, biotechnology produces enabling technologies for many civilian applications that contribute to future information accumulation and product and process improvements. This information core not only permeates the society in which the development takes place: today's globalization and growing interdependence inevitably entail its diffusion across national borders. While lateral proliferation processes are undeniably taking place, the greatest challenge to the future BTWC regime may actually come from a sudden massive application of civilian biotechnology for the purpose of acquiring a biological warfare capability within a state party.

The following scenario assumes that the implementation of the protocol to the BTWC is successful. As a result, confidence in the assumption that biotechnology works for the greatest benefit of mankind is growing while concerns about the realization of the dual-use potential are receding. However, after several decades a major crisis (food or water shortage, migratory pressure, and so on) erupts and leads to an armed conflict between two or more states. A military victory is elusive and one of the warring parties decides to use off-the-shelf biotechnology for the manufacture of biological warfare agents and its antidotes at short notice. Decades of process and product improvements in the civilian sector have provided scientists, engineers and technicians with the skills to meet this demand at short notice: a pathogen is slightly modified to overcome enemy defences and the engineered antidote is produced on a large scale to protect the own troops and population. The ravaging disease decimates the enemy; its society collapses and the victor has new space and resources for its expanding population. There was never any time to respond to the unfolding crisis under the BTWC and its protocol before the end of the war. A successful security regime of many decades crumbles within a matter of weeks.

This pessimistic scenario is not without precedent. More than 100 years ago advances in chemistry, together with an increasingly utilitarian application of scientific principles driven by an economic rationale, was propelling the second industrial revolution in West Europe and the United States. Most of the chemical compounds that were eventually used as warfare agents in the First World War had been discovered many decades earlier and some played an important role in the then rapidly expanding chemical industry. For example, chlorine, the main agent in the German CW attack near Ypres on 22 April 1915, was first prepared in 1774.²² Phosgene, the prime killer agent of the First World War, was discovered in 1811.²³ The skin blisters and symptoms of conjunctivitis typical of exposure to mustard gas were already described in a two-part study on olefines published in 1860–1861.²⁴ No one was actively considering the exploitation of the toxic properties of these new compounds in combat. However, there was a rising concern about the ability to mobilize the rapidly expanding industrial capacity in support of a future war effort. Russia, then a primarily agrarian society, sought to restrain the impact of technology and industrialization on future war fighting capabilities and the resulting 1899 Hague Peace Conference produced, among other key documents, the Declaration (IV, 2) Concerning Asphyxiating Gases. The contracting powers agreed to abstain from the use of projectiles whose object is the diffusion of asphyxiating or deleterious gases. However, the declaration could not withstand military necessity. By the late autumn of 1914, Germany's lightning war in Belgium and France had bogged down in trench warfare and a frantic search began to find a technology that could restore the offensive. Toxic chemicals were one of the first and almost immediately available solutions. In April 1915 Germany circumvented the declaration by releasing the gas from cylinders, but by the time gas projectiles were introduced, the document had become all but irrelevant.

The types of international agreement in the hypothetical scenario and the historical example differ significantly. However, in both cases military necessity pushes a technology transfer from civilian to military application, thereby ignoring international law. Chemical warfare contributed significantly to the integration of science, military and industry, so that the military potential of civilian applications is now immediately recognized. The exploration of potential spin-off effects of civil-led technology developments for military purposes has almost become standard practice in order to reduce the cost of weapon systems or to achieve shorter cycles of technological innovation. Going against this trend, the BTWC seeks to exclude the potential military exploitation of civilian biotechnology developments. Yet this goal cannot be fully achieved because the permitted development of the means to defend against BW is inescapably linked to the possession of knowledge about current and potential biological warfare agents.

If the protocol to the BTWC is to remain relevant for many decades to come, it will require new mechanisms to deal with the instant realization of the dual-use potential of biotechnology within a state party. In addition to the traditional verification and monitoring of the destruction and

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non-production of BW in states parties, it must incorporate an understanding of biotechnology and technology transfer processes that goes beyond mere products (agents, production equipment, etc.). The aim of this new set of tools is to render transparent technology transfers between economic units within a state party and between economic units across national boundaries. All economic units — states, companies and institutes, or individuals — involved in a transaction will share the responsibility of ensuring that the dual-use potential of the technologies is not realized. The explicit commitment by the economic unit, whether a supplier or a recipient, to uphold this responsibility will then become a key component for granting the transfer license. The principle also applies to scientific and student exchanges as in-depth background knowledge will enhance the transparency about the institute's and the individual's

activities. The national authorities and the international organization to be set up under the protocol will monitor the transparency of all relevant technology transfers. This mechanism of shared responsibilities between suppliers and recipients can facilitate assistance to countries such as Russia as confidence in the compliance with the BTWC will grow, while making it much harder for future Iraqs or representatives of terrorist organizations to acquire the BW-relevant technologies.

This set of tools must nonetheless be supplemented with extensive positive security guarantees in order to reduce the disproportionate military advantage a state party might gain from defecting from the treaty. These guarantees do not solely entail the right of access to assistance and protection (subject to the transparency conditions mentioned above), but also involve dynamic decision-making procedures in order to be able to respond swiftly and decisively in the case of a rapidly developing crisis. If adequately implemented, the mechanisms to enhance the transparency of technology transfers may be able to provide sufficient advance warning of an impending massive transfer of civilian technology for prohibited purposes.

Notes

- ¹ See, for example, Julian P. Perry Robinson, 'Chemical weapons proliferation: security risks', in Jean Pascal Zanders and Eric Remacle, eds., *Chemical Weapons Proliferation: Policy Issues Pending an International Treaty*, Proceedings of the 2nd Annual Conference on Chemical Warfare, Vrije Universiteit Brussel, 16 March 1990 (Centrum voor Polemologie, Vrije Universiteit Brussel, Brussels, 1991, pp. 69–92.
- ² The BW programmes of several countries are analyzed in Erhard Geissler and John Ellis van Courtland Moon, eds., *Biological and Toxin Weapons: Research, Development and Use from the Middle Ages to 1945*, SIPRI Chemical & Biological Warfare Studies, no. 18, Oxford, Oxford University Press, 1999, 279p.
- ³ Counterproliferation Program Review Committee, *Counterproliferation: Chemical Biological Defense*, CPRC Annual Report to Congress (1997), chapter 3. <http://www.acq.osd.mil/cp/cprc97.htm>
- ⁴ *Current and Projected National Security Threats to the United States*, Hearing before the Select Committee on Intelligence, United States Senate, 105th Congress, Second session, Washington, DC, Government Printing Office, 1998, p. 9.
- ⁵ Maj. Gen. V.S. Belous and A.I. Podberezkin, 'There is no alternative to chemical disarmament', *Nezavisimoye Voyennoye Obozreniye (Moscow)*, 4–10 June 1999, p. 4, in 'Chemical weapons disarmament viewed', Foreign Broadcast Information Service, *Daily Report—Central Eurasia (FBIS-SOV)*, FBIS-SOV-1999-0626, 30 June 1999.
- ⁶ Remarks to the NATO Workshop in Vienna on 22 June 1998, as reproduced in US Department of Defense, 'Hamre: Counterproliferation efforts must include defense against cyberattacks, WMD', *Defense Viewpoint*, vol. 13, no. 44. <http://www.defenselink.mil/speeches/1998/s19980622-depsecdef.html>
- ⁷ US Department of Defense, *Proliferation: Threat and Response*, Washington, DC, November 1997, via Defense Link, <http://www.defenselink.mil/pubs/prolif97/>
- ⁸ Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, OTA-ISC-559, Washington, DC, Government Printing Office, August 1993, pp. 65–66.
- ⁹ J.A. Lauder, Special Assistant to the Director of Central Intelligence for Nonproliferation, 'Unclassified statement for the record on the worldwide WMD threat to the Commission to Assess the Organization of the Federal Government to combat the Proliferation of Weapons of Mass Destruction', 29 April 1999, http://www.odci.gov/cia/public_affairs/speeches/archives/1999/lauder_speech_042999.html; Arms Control and Disarmament Agency, *Adherence to and compliance with arms control agreements*, 1998 report submitted to the Congress, Washington, DC, 1999, <http://state.gov/www/global/arms/reports/annual/comp98.html>; Central Intelligence Agency, Nonproliferation Center, *Unclassified report to Congress on the acquisition of technology relating to weapons of mass destruction and advanced conventional munitions, 1 January through 30 June 1999*, Washington, DC, February 2000, http://www.odci.gov/cia/publications/bian/bian_feb_2000.html
- ¹⁰ Petra Lilja, Roger Roffey and Kristina S. Westerdahl, *Disarmament or Retention: Is the Soviet Biological Weapons Programme Continuing in Russia?*, Umeå, Swedish National Defence Research Establishment, December 1999, p. 10; Jonathan B. Tucker, 'Biological weapons in the former Soviet Union: An interview with Dr. Kenneth Alibek', *Nonproliferation Review*, vol. 6, no. 3 (Spring–Summer 1999), p. 9.

- ¹¹ Amy E. Smithson, *Toxic Archipelago: Preventing Proliferation from the Former Soviet Chemical and Biological Weapons Complexes*, Report no. 32, Washington, DC, Henry L. Stimson Center, December 1999, p. 16.
- ¹² Tucker, op. cit., p. 6.
- ¹³ 'Russia: stricter export controls imposed on goods usable in arms production', Russian Federation Government Directive no. 57 (22 January 1998), *Rossiyskaya Gazeta* (Moscow), 18 February 1998, p. 1 in 'Russia: Chernomyrdin decree on dual-use goods export controls', FBIS-TAC-98-048, 21 February 1998.
- ¹⁴ '30 June', *CBW Conventions Bulletin*, no. 41, September 1998, p. 33.
- ¹⁵ Comprehensive Threat Reduction Programme, 'CTR – Kazakhstan: Biological Weapons Production Facility Dismantlement', <http://www.dtra.mil/ctr/projects/projkaz/kpj-bwp.html>, version current 3 September 2000.
- ¹⁶ The task of inspecting, destroying and removing all of Iraq's nuclear weapon capabilities was assigned to the International Atomic Energy Agency (IAEA). UNSCOM's mandate also included to assist and co-operate with the IAEA in its work in Iraq.
- ¹⁷ The table was prepared by Maria Wahlberg, SIPRI CBW Project.
- ¹⁸ The procedure was adopted at the Third Review Conference of the BTWC in 1991. *Final Document of the Third Review Conference of the Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction*, Part II, Final Declaration, document BWC/CONF.III/22, 27 September 1991, Article V. It was invoked by Cuba on 30 June 1997 in order to investigate an alleged American attack with biological warfare agents in October 1996.
- ¹⁹ For more detailed analysis, see Jean Pascal Zanders, 'Assessing the risk of chemical and biological weapons proliferation to terrorists', *Nonproliferation Review*, vol. 6, no. 4 (Fall 1999), pp. 17–34; Jean Pascal Zanders, Edvard Karlsson, Lena Melin, Erik Näslund and Lennart Thaning, 'Risk assessment of terrorism with chemical and biological weapons', *SIPRI Yearbook 2000: Armaments, Disarmament and International Security*, Oxford, Oxford University Press, 2000, pp. 537–58.
- ²⁰ *Ibid.*, pp. 549–54. The computer simulation was prepared and run by the Swedish National Defence Research Establishment (FOA), Umeå, Sweden. In the Sverdlovsk incident an estimated 4 billion respirable spores became airborne and approximately sixty-five people died.
- ²¹ In order to generate 4 billion respirable anthrax spores, a total of approximately 80 billion would have to be released. Such an amount can easily be suspended in a few litres of solution. With optimal distribution and inhalation this number could infect approximately 4–5 million people (the infective dose is assumed to be 8,000–10,000 inhaled spores). However, this estimate is of limited value since only a small fraction of the released spores would reach people because of the dispersion in the atmosphere. An even smaller fraction of the amount would be respirable. *Ibid.*, p. 550.
- ²² J. Meyer, *Der Gaskampf und die chemischen Kampfstoffe* [Chemical warfare and chemical warfare agents], Leipzig, Verlag von S. Hirzel, 1925, p. 308.
- ²³ T.A. Ryan, C. Ryan, E.A. Seddon and K.R. Seddon, *Phosgene and Related Carbonyl Halides*, Amsterdam, Elsevier, 1996, pp. 4–12.
- ²⁴ F. Guthrie, 'On Some Derivatives from the Olefines', *Quarterly Journal Chemical Society*, vol. 12, pp. 109–20; and F. Guthrie, 'On Some Derivatives from the Olefines', *Quarterly Journal Chemical Society*, Vol. 13, pp. 129–35.

The BTWC in Historical Perspective: From Review and Strengthening Processes to an Integrated Treaty Regime

Nicholas A. SIMS

Looking back over our Convention's first twenty-five years in force,¹ we find not a simple linear progress ever onward and upward, but a more complicated history. It has been complicated by vicissitudes of reputation and credibility. More than anything else it has suffered from the failure of some States Parties to demonstrate their compliance with its obligations credibly and consistently, and the failure of the States Parties collectively to get to grips with the problem. The Protocol now emerging in the Ad Hoc Group will be a good test of the seriousness with which the problem of compliance is addressed. Up to now, too many accusations and suspicions have been left hanging in the air, unresolved. The Protocol must put that right.

Too few States Parties have cherished and nurtured the Convention constantly over its first twenty-five years. But all credit to those which have — and, more particularly, all credit to the beleaguered 'friends of the Convention' who stayed loyal to it during the dark days of 1980–86 when arms control was suspect, disarmament almost unmentionable, in some powerful circles. That was when our Convention came nearest to being discredited and discarded altogether.

It had to be nursed back to health, by friends of the Convention in governments, universities and NGOs, against a background of uncertainty over how genuinely and fully its obligations were being observed by all States Parties, let alone what some non-parties might be up to. And all the time there was growing anxiety over what effect science and technology were having on the balance of incentives and disincentives to abide by the Convention, as the revolution in genetics gathered pace and fears arose that offensive biological and toxin weapons (BTW) possibilities might acquire greater military salience and outstrip the means of protection. Such fears continue to overshadow the Convention.

Yet some things *have* been achieved. There has been consolidation of the norm that the international community repudiates BTW so absolutely that nothing short of complete elimination of these weapons and capabilities will suffice. At entry into force there were forty-six original parties: almost 100 have joined them since. The Convention has generated a treaty regime with its own capacity for evolution. It has begun to take root in civil society and, significantly, in the ethics of the medical profession as (to a lesser extent, some would say) in the scientific community.

There is also a growing recognition of the strength which the Convention as a legal instrument derives from the 'general purpose criterion' necessarily contained in its Article 1: necessary in terms of its comprehensiveness of scope, to cover new developments in science and technology and

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guard against the exploitation of loopholes and ambiguities. And even on the most pessimistic assumptions about the number of states with clandestine BTW programmes, the fact remains that the overwhelming majority of States Parties have complied. States which could, quite easily, have taken the 'offensive' road to acquiring a BTW capability have refrained from doing so; and several of them have made that decision even more irreversible by withdrawing reservations which they had attached long ago to their ratification of the 1925 Geneva Protocol. It took some of us a long time to get the message across that such action was necessary. We started right back in 1972. But eventually more and more governments got the message and acted to make their renunciation of BTW absolute and unconditional, under the 1925 Protocol as well as under our Convention.

So there are reasons to celebrate, as we mark the twenty-fifth anniversary of the Convention's entry into force, in addition to all the reasons to be cautious, concerned and insistent upon the urgent need to strengthen this pioneering treaty regime of biological disarmament.

The current task

The structure of our disarmament treaty regime has to be strengthened, to be as resilient as it can be, against the sheer unpredictability of future international conditions and against what the first resolution ever adopted by the UN General Assembly in a memorable phrase called "the hazards of violations and evasions" — hazards against which it wanted "complying States" to be protected by "effective safeguards by way of inspection and other means".² That resolution of 24 January 1946

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set the continuing agenda. Hence 'measures to promote compliance', to which the Ad Hoc Group has been devoting a deliberately high proportion of its meetings ever since 1995.

I find it encouraging that among the wide range of measures to promote compliance which have been proposed, starting all over again is not an option. Instead of despairing of the Convention, what we find is a determination to persevere in making the Convention work better.

In historical perspective what we see is an intensification, over the past eight years, of a strengthening process set in train from VEREX³ in 1992–93. That in turn built on the evolution of the treaty regime through clarifications, definitions and elaboration of procedures achieved at the first three Review Conferences in 1980, 1986 and 1991, and reaffirmed at the Fourth Review Conference in 1996. Before we return to this strengthening process we need to examine the performance of the Review Conferences, what they have achieved and where they have been found wanting.

The Review Conferences in historical perspective

The Second and Third Review Conferences have been generally credited with the regime-building successes of the Convention. Certainly they added formal confidence-building measures (CBMs) with the authority of politically binding commitments, first in 1986 and then in their enhanced and expanded form in 1991. The Final Declarations of those years benefited from a warmer international political climate, and reflected the resulting co-operation within the Second and Third Review Conferences in those areas where a consensus could be found on expressing the common mind of the States Parties and steering the evolution of their treaty regime accordingly. They did this without amending the Convention or setting up new institutions, merely drawing out the implications and possibilities latent within the text of the Convention as it stood.

Yet the undoubted — and very welcome — achievements of 1986 and 1991 should not be allowed to overshadow completely the role of the First Review Conference. In March 1980, under very difficult conditions, the Conference took the first steps towards the more assured progress of 1986 and 1991.

In historical perspective, the First Review Conference merits a more positive assessment than it has customarily received. The origins of several features of the treaty regime flowing from the Convention can be traced back to 1980. What is more, it was then that agreement was reached on the controversial idea of *continuing* review (going beyond the single-conference requirement of Article XII).

It was the First Review Conference that welcomed declarations already made and called on the other States Parties to come clean on their BTW status: were they former possessors which had destroyed their stockpiles under Article II, or had they never possessed any BTW at all? This confidence-building element was later in effect subsumed under a new 1991 confidence-building measure (CBM 'F') on the disclosure of past offensive BTW programmes going back to 1946. It is still arguable that the Convention would have been the stronger for straightforward declarations, of the kind that were envisaged when Article II was being negotiated and that were invited in 1980, because without such unambiguous declarations uncertainty persisted over the fate of certain BTW stockpiles and when (or even whether) they had been destroyed. Such uncertainty has proved corrosive of confidence in the Convention.

It was likewise the First Review Conference that initiated the sharing of legislative experience, by inviting States Parties which had taken action under Article IV to make the relevant legislative and administrative texts available through the UN for purposes of consultation. This initiative was the first in the important area of national implementation. It may be seen in retrospect as a kind of proto-CBM. In 1991 it became part of a new, full CBM ('E'). Review Conferences have come belatedly to recognize the value of Article IV and the vital role that national implementation has to play, in complement with the structure of international obligations under the Convention. The much fuller Article IV sections of more recent Final Declarations (and Article X in the draft Protocol) have built on the foundations laid in 1980.

Cumulative evolution is also apparent in respect of the contingency mechanism for handling compliance concerns which the First Review Conference created within the framework of Article V and under the rubric of its "appropriate international procedures" formula. Subsequent Review Conferences elaborated this mechanism, filling in the gaps and making explicit the conditions for its successful application which were already apparent in 1980 although for political reasons they could not immediately be included in the Final Declaration. The mechanism was finally invoked in 1997 by Cuba in the matter of the *Thrips palmi* infestation of crops first detected in December 1996. In July and August 1997 informal and formal Consultative Meetings took place, as required under the procedure elaborated in the Article V section of successive Final Declarations.

The First Review Conference was inhibited most obviously by the rapidly cooling climate of international relations, as the 'second cold war' took hold of East and West. It was also inhibited by the proximity of the Second NPT Review Conference (11 August to 7 September 1980), for which many of its participant delegations were busy preparing with varying degrees of apprehension and a keen concern not to compromise their bargaining positions in advance. Notoriously, it took place under the malign shadow of the Sverdlovsk incident (the human anthrax outbreak of April 1979, which became the subject of requests for bilateral consultation under Article V, for the first time formally, in March 1980), and this at a time when the Soviet Union was feeling the impact of non-aligned as well as Western condemnation of its military intervention in Afghanistan which had begun just ten weeks before. It arrived for the review already on the defensive — and it was notably

suspicious of anything which might tend to *revision* of the Convention. It had to be reassured that review, or examination (*examen* in the French title of the conference, *para examinar* in the Spanish), did not amount to revision. For the same reason any reinforcement of the Convention which could be attempted in March 1980 had to be limited to *clarification*. To *clarify* the Convention was acceptable when overt *strengthening* was not. That would come later.

In these circumstances, the First Review Conference achieved as much as could be expected, and perhaps a little more. The Final Declaration was a slender document indeed when compared with its successors, but the first necessary foundations had been laid.⁴

Cumulation has been characteristic of the first four Review Conferences. New proposals for the Final Declaration of the Fifth Review Conference are likely to be included (if at all) at the end of their respective sections, after the declarations of 1980, 1986, 1991 and 1996 have been dutifully reaffirmed, article by article.

It is to be hoped that the Fifth Review Conference will also carry forward the practice of interpreting Article I of the Convention with care to affirm the comprehensive scope of its prohibitions. This has become a valuable tradition of the review process, tackling (notably in 1986, 1991 and 1996) problems of definition and issues of concern in science and technology which have arisen between conferences. There is already an impressive body of interpretation, with the authority of past Review Conferences, to be deployed against any temptation for an inadvertent definitional loophole to be exploited. Comprehensiveness of legal coverage is important. It cannot guarantee that governments will never develop BTW, but it can and does reaffirm that any such development would be a violation of the Convention.

Missed opportunities and institutional deficit

There have also been missed opportunities along the way. Review Conferences have been especially poor at follow through. Two areas in particular demonstrate this weakness of the review process.

The first area is the long-desired improvement of institutional mechanisms for international co-operation in peaceful uses of microbiology, including prevention of disease. Current debates over measures to implement Article X, including a prospective Cooperation Committee to provide the framework for promoting such measures more actively, are taking place in the context of the Ad Hoc Group's negotiation of Article VII of the draft Protocol. These debates ought to have taken place long ago, according to decisions of the Second and Third Review Conferences, in a "relevant body" of the UN, but their 1986 and 1991 requests to the Secretary-General, contained in the Article X sections of their Final Declarations, were simply ignored. No one followed them up, even though the 1991 request added a deadline (1993) for the inclusion of that item on the agenda of the chosen "relevant body" and provided for elaborate consultation with all interested agencies.⁵

There has been no shortage of suggestions for developing this area of the treaty regime to give more practical substance to the lofty sentiments of Article X. But there has been no machinery for taking these suggestions forward as successive Review Conferences had requested. In short, the Convention continues to labour under the burden of a grievous institutional deficit.

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The second area is CBMs. The Third Review Conference stepped back at the last minute from the creation of a small "secretariat unit" dedicated to helping States Parties honour their newly agreed CBM commitments. This failure caused acute disappointment to

governments and NGOs which had seen such a unit as the minimal acceptable outcome of their efforts in 1990–91 to secure some inter-sessional machinery for the benefit of the Convention as a whole through the long intervals between reviews. The Fourth Review Conference, although making unprecedented space for NGO contributions to the conference to be heard at last, saw no advance on the institutional front. There is still no Convention secretariat, or even a CBM unit, let alone any kind of inter-sessional or interim committee to give the Convention the continuous support and oversight it has always needed. This institutional deficit remains a major weakness, yet to be remedied.

Since 1995 the institutional deficit of the Convention has been masked by the existence of the Ad Hoc Group, meeting in several sessions each year and maintaining the attention of some forty to fifty States Parties at a high level of interest. However, the Ad Hoc Group has a specific mandate which would preclude it from overseeing the operation of the Convention on a continuing basis even if it were not preoccupied with the negotiation of a particular Protocol, due by 2001 at the latest.

After 2001 the institutional deficit will become evident again. It never went away; the strengthening process of 1992–2001 merely (and regrettably) obscured the urgency of the institutional imperative, notably after the 1994 Special Conference brought the Ad Hoc Group into being from 1995.

The new Organization for the Prohibition of Bacteriological (Biological) and Toxin Weapons (OPBW) to be created by Article IX of the Protocol will be open only to those States Parties to the Convention which also join the Protocol. In the long run, it is to be hoped that the two rosters of States Parties will be coterminous; in the short run, this seems very unlikely. There will therefore be a continuing need for the States Parties to the Convention to have their own interim machinery for at least some years after the entry into force of the Protocol. *A fortiori*, interim machinery is needed pending that entry into force, because during this interval, while Protocol signatories contemplate ratification, there will not be an organization at all. Depending on how long it takes to secure the necessary number of ratifications to the Protocol, this could mean several years between the end of the Ad Hoc Group and the launch of the Organization.

Supportive institutions for an interim Convention regime

An interim regime of supportive institutions is needed to watch over the health of the Convention during that interval, and also during the early years after the Protocol has entered into force, so long as a significant disparity exists between the two rosters of States Parties. However, it is important to emphasize the *interim* character of these proposed arrangements. They do not involve any amendment to the Convention. Neither do they set up competition with the new Organization. In short, they threaten no one.

Supportive institutions for an interim Convention regime to bridge the gap between at least the Fifth and Sixth Review Conferences, and probably the Sixth and Seventh too, can be put in place by the Fifth Review Conference on a strictly temporary basis. It will be clearly understood that these arrangements are to lapse when there is sufficient similarity between the two rosters (enabling their review conferences to coincide in time and place, in 2011 though probably not as early as 2006), and sufficient capacity in the Organization to care for the Convention as well as the Protocol, for the

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interim regime safely to be declared redundant. Synchrony of reviews in 2011 might provide the occasion for this to happen.

Specifically, the Fifth Review Conference should appoint its Bureau, or elect other States Parties ad hoc, as an interim or inter-sessional committee of oversight, entrusted with the general care of the Convention and its effective operation in the interests of the States Parties as a collectivity, until the Sixth Review Conference. In 2006 the Sixth Review Conference could renew or amend the mandate of the committee and change its membership as necessary. If, by that time, the Protocol has entered into force there will be a need to ensure that the committee of States Parties to the Convention works closely with the Organization of States Parties to the Protocol, until (if possible by 2011) the two rosters are approximately co-terminous, and the interim regime can fold into the permanent one, integrating the Convention with its Protocol.

In the meantime, following the Fifth Review Conference, the committee of oversight will need a small secretariat. There is no danger of governments creating a cumbersome bureaucracy. On past form, they are much more likely to spend too little on the infrastructure of biological disarmament than too much.

The prospect of an eventual Organization should not be allowed to obscure the urgent need for an interim regime of supportive institutions — the inter-sessional committee of oversight and its small secretariat — which would give the Convention the continuity of attention and collective identity it has hitherto lacked.

The prospect of an eventual Organization should not be allowed to obscure the urgent need for an interim regime of supportive institutions — the inter-sessional committee of oversight and its small secretariat — which would give the Convention the continuity of attention and collective identity it has hitherto lacked. They would serve all States Parties to the Convention equally, irrespective of differences of status with regard to the Protocol before and (at least for a time) after its entry into force.

The BTWC Protocol and the CWC

The strengthening process — through VEREX in 1992–93, the Special Conference in 1994, then since 1995 the Ad Hoc Group and BTWC Protocol negotiations — has been greatly influenced in perceptions of what is realistically attainable by the parallel progress of the CWC. Its purpose-built organization, the Organisation for the Prohibition of Chemical Weapons (OPCW), has been demonstrating how a contemporary disarmament treaty regime can be made operational. I do not underestimate the OPCW's problems, but at least it has made a start: declarations and inspections have become the reality in chemical disarmament under fully international verification. This verification was hardly conceivable in 1971 when our Convention was negotiated, or even in 1975 when it entered into force.

The effect of the CWC example has been profound. Its exemplary influence is found in almost every Article of the Protocol as it is shaping up; where it is not, it will be vitally important for the Ad Hoc Group to make sure that comparison of the two texts does not at any point convey the implicit message that BTW is less of a threat than CW and requires looser wording or weaker safeguards. That would be a disastrous mistake. Instead of falling short of the standard set by the CWC, the Protocol needs at some points to be a stronger instrument, and the OPBW must be robust from the start, benefiting from the experience of the OPCW since 1997.

The next twenty-five years: towards an integrated treaty regime

The BTWC has taken root over the twenty-five years since entry into force. Now the challenge of the next twenty-five years is to deepen those roots. Biological disarmament must become ever more profoundly embedded in the structure of international society, ever more firmly entrenched in the legislation, the practice and the *ethos* of every state, so that BTW comes to be seen as having been more universally and convincingly renounced than was the case in 1975 — renounced by all states and not just some.

The Protocol will have a major part to play in meeting that challenge, giving comprehensive and credible effect to the complete and permanent elimination of BTW, not least by addressing systematically “the hazards of violations and evasions”. The sooner it enters into force, the sooner a permanent Organization comes into existence in the service of disarmament. A well-designed and professionally staffed Organization will generate confidence and sufficient momentum to bring in to the Protocol the great majority of States Parties to the Convention sooner rather than later, so that they can all benefit from participation in the strengthened treaty regime of biological disarmament and enjoy membership in their own, purpose-built, Organization. That is the point at which the previously mentioned interim regime, a regime of supportive institutions for the Convention, should fold into the permanent regime integrating the Convention with its Protocol.

In twenty-five years time the ‘friends of the Convention’ will have a quite different perspective — of the Convention’s first fifty years in force. By that time we, or they, should expect to see several things. Each of us has a wish list. Mine includes:

- participation extended from 75% of states to 100%;
- continuous demonstration of compliance under effective safeguards;
- comprehensive national legislation and implementation through National Authorities in each State Party;
- good co-operation between National Authorities and the Organization;
- effective handling of compliance concerns;
- effective promotion of Article X measures achieved at last through the Cooperation Committee and the promotional framework it develops, particularly (in the words of Article X) “for prevention of disease”;
- balanced evolution of all sectors of the treaty regime;
- stronger involvement of NGOs and the professions (especially the medical profession) in the treaty regime; and
- that BTW be seen as a threat to humanity as a whole, but a threat which can be successfully countered by deliberate international action through strengthened institutions under the Convention and, by that time, its well-established Protocol, together constituting an integrated treaty regime.

But these things will not come about without conscious and sustained effort. There is no guarantee that the Convention will survive another twenty-five years. It could yet collapse, or fall into neglect and disrepute. It is a solemn responsibility incumbent on all of us to make sure that never happens.

Conclusion

So, in conclusion, let us remember with gratitude all those who helped fashion the Convention and nurtured its early life, including those who have not lived to see it reach twenty-five years in force. We owe them a special debt of gratitude and we are under a particular sense of obligation to them. We who have survived to commemorate this anniversary may use this occasion to reaffirm our commitment to biological disarmament — and to promoting the health of this treaty regime, its effectiveness in practice and its strengthening as a permanent and reliable element in the emerging disarmament structure of international relations.

Notes

- ¹ The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, commonly abbreviated BWC or BTWC, was opened for signature on 10 April 1972 and entered into force on 26 March 1975.
- ² General Assembly res. 1 (I), paragraph 5 (d), 24 January 1946.
- ³ VEREX is the Ad Hoc Group of Governmental Experts on scientific and technical aspects of potential verification measures, established by the BTWC Third Review Conference (1991) and active in 1992–93. It reported to the Special Conference of States Parties in 1994. It must not be confused with the Ad Hoc Group of States Parties established by the Special Conference in 1994 and active since 1995, which is here referred to simply as the Ad Hoc Group.
- ⁴ For a full account and analysis of the First Review Conference, see Nicholas A. Sims, *The Diplomacy of Biological Disarmament: Vicissitudes of a Treaty in Force, 1975–85*, London, Macmillan; New York, St Martin's Press, 1988.
- ⁵ The Fourth Review Conference (1996) reiterated this request to the UN Secretary-General, who was asked to propose this item for inclusion on the agenda of a relevant UN body "before the next Review Conference", i.e. by 2001.

Opportunities for the Fifth Review Conference

Graham S. PEARSON

The Fifth Review Conference in 2001 provides real opportunities for the States Parties to the Biological and Toxin Weapons Convention (BTWC) to extend their understandings of the Convention, which — through being reflected in the Final Declaration — strengthen the prohibition regime for biological and toxin weapons. At the Fourth Review Conference in 1996, attention was primarily focussed on the ongoing Ad Hoc Group negotiations of a Protocol to strengthen the effectiveness and improve the implementation of the Convention and considerable care was taken, and rightly so, to do nothing which might impede the work of the Ad Hoc Group.¹ Now, five years later, much attention has been focussed on the Protocol negotiations that are now close to completion with the principal elements of the Protocol elaborated and detailed in the text. There will be few changes from the current draft Protocol and it is timely to begin to look ahead to the twenty-first century and what else needs to be done to strengthen the Convention.

There are several issues that need to be addressed that emerge from the Protocol negotiations as some of the proposed, but thus far not agreed, language would have the effect of modifying the scope of the Convention. This would go beyond the mandate of the Ad Hoc Group, which is limited to a legally binding instrument to strengthen the effectiveness and improve the implementation of the BTWC. Other issues arise from the review of any new scientific and technological developments relevant to the Convention required under its Article XII. All of these will need to be addressed in the article by article review of the Convention.

For clarity it is useful here to consider these issues according to the article under which they could be considered at the Fifth Review Conference.

Article I

The basic prohibition of the BTWC is enshrined in the general purpose criterion of Article I — under which the States Parties undertake never in any circumstances to develop, produce, stockpile or otherwise acquire or retain "(1) Microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes."

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At the Fourth Review Conference the Final Declaration on Article I reaffirmed that the prohibition in Article I applied to “scientific and technological developments, inter alia, in the fields of microbiology, biotechnology, molecular biology, genetic engineering and any applications resulting from genome studies.” Furthermore the Final Declaration reaffirmed that the BTWC unequivocally included “all microbial and other biological agents or toxins, naturally or artificially created or altered, as well as their components, whatever their origin or method of production.”

It will be necessary, and appropriate, for the review of new scientific and technological developments to consider what advances might usefully be specifically referred to in the Final Declaration in order to ensure that there are no perceived omissions or exclusions that might be exploited in a way that is inconsistent with the objectives and purposes of the Convention. It will be important to give consideration to language in the Final Declaration that unequivocally reaffirms that the coverage of the prohibition in Article I is all embracing.

Examples of issues that should be addressed relate to bioregulators, which are essential for normal bodily functions but can cause harm if administered in unusual quantities, and to genetic recombinations. Further issues relate to the use of pests or vectors as a method of warfare or for hostile purposes, a topic that has arisen during the negotiation of the Protocol.

Another issue that needs to be tackled is that of non-compliance. This is again a difficult issue as it must consider the non-compliance of States Parties who are participants in the Review Conference. They can dilute the language adopted for the Final Declaration, as happened in 1996 at the Fourth Review Conference. It is nevertheless important that concerns about non-compliance are addressed—it is hardly indicative of an effective Convention and international norm if statements are made, as by one of the Depositaries, the United States, in 1996, that the number of states possessing or seeking to possess biological weapons had more than doubled since the entry into force of the Convention. After all, when looking back to the Third Review Conference in 1991, there were significant statements then about the non-compliance of the Soviet Union and Iraq and, in neither case, have subsequent events resolved the issues satisfactorily.

Finally, the useful strong language agreed in 1996 about the prohibition of use needs to be reaffirmed in the Final Declaration of the Fifth Review Conference.

Article II

A more difficult issue, but again an opportunity for the States Parties to extend their joint understandings, relates to production facilities that have been used in previous offensive biological weapons programmes. The prohibition in the BTWC makes it clear that no State Party shall develop, produce, stockpile or otherwise acquire and retain microbial or other agents or weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict. Furthermore, under Article II each State Party undertakes “to destroy or divert to peaceful purposes, ... not later than nine months after entry into force of the Convention, all agents, toxins, weapons, equipment and means of delivery specified in Article I of the Convention.” There is no mention of production facilities — in contrast to the Chemical Weapons Convention’s Article I, under which States Parties undertake to destroy chemical weapons production facilities. There would be considerable benefit from language under Article II in which the Conference affirmed that production facilities should be destroyed or irreversibly converted to peaceful purposes.

Article III

In this article each State Party “undertakes not to transfer to any recipient whatsoever ... any of the agents, toxins, weapons, equipment or means of delivery specified in Article I of this Convention.” The Fourth Review Conference called for all States Parties to take appropriate measures to implement this obligation. Furthermore, it noted that “States Parties should consider ways and means to ensure that individual and subnational groups are effectively prevented from acquiring, through transfers, biological agents and toxins for other than peaceful purposes.” At the Fifth Review Conference attention should be given to strengthening this language given the increased concern expressed in many States about the possible use of biological agents and toxins by terrorist groups. There would also be benefit from considering the measures being adopted internationally to implement the Cartagena Protocol on Biosafety to the Convention on Biological Diversity under which States require Advance Informed Agreement prior to the import of genetically modified organisms.

Article IV

Each State Party is obliged under this article to take appropriate national measures to prevent and prohibit the development and production of biological weapons. At the Fourth Review Conference the States Parties recognized “the need to ensure, through the review and/or adoption of national measures, the effective fulfilment of their obligations under the Convention in order, *inter alia*, to exclude use of biological and toxin weapon weapons in terrorist or criminal activity.” Given the increased concern about terrorist groups, there would be merit in States Parties giving increased attention to the adoption of national measures. Whilst there have been exhortations at successive Review Conferences for States Parties to provide information to the UN Department of Disarmament Affairs on specific legislation, more needs to be done with this information — it should be provided to all States Parties, thereby aiding those who have yet to take appropriate national measures to do so.

Since the Fourth Review Conference proposals have been made to strengthen the prohibition regime against biological and chemical weapons through the international criminalization of work on such weapons by regarding it as being in the same category as the crimes of piracy, torture and hijacking. The Fifth Review Conference could usefully encourage further examination of these proposals by the Sixth Committee of the General Assembly with a view to the negotiation of an international jurisdiction treaty.

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At successive Review Conferences, the Conference has noted the importance of “inclusion in textbooks and in medical, scientific and military education programmes of information dealing with the prohibitions and provisions contained in the ... Convention.” It is, however, apparent that there is a real need for a global outreach programme to ensure that all medical, scientific and military personnel are aware of the prohibitions of the Convention. Given the potential of the Internet, it should be possible to mount an effective awareness raising campaign.

Article V

Under this article, States Parties “undertake to consult one another and to co-operate in solving any problems which may arise in relation to the objective of, or in the application of the provisions of, the Convention.” The confidence-building measures (CBMs) agreed at the Review Conference in 1986 and extended and strengthened in 1991 come under this article. At the Fourth Review Conference in 1996 little attention was paid, because of the ongoing Ad Hoc Group consideration of a Protocol, to the CBMs other than to continue to urge “all States Parties to complete full and timely declarations in the future.” At the Fifth Review Conference, the outcome of the Protocol negotiations will be apparent and it will be timely and appropriate to give more detailed consideration to the quality of the information provided under the CBMs as these obligations will continue for all States Parties. It is evident that there is much variation between States Parties in the attention given to provision of information under the politically binding CBMs and it will be appropriate to examine how the quality of the information provided can be both harmonized and upgraded. There would be considerable benefit from making the CBM information more widely available as it is clear to those engaged in the field that some of the information is inaccurate — which hardly contributes to building confidence.

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Another topic for consideration under Article V are the procedures to strengthen the implementation of Article V that were adopted at the Third Review Conference. They were invoked by Cuba in 1997 in respect of the outbreak of *Thrips palmi* in Cuba and it will be appropriate at the Fifth Review Conference to examine and review the procedures. One point that might usefully be considered is the provision of information to the public. Public knowledge that the BTWC is alive and functioning well is important for the strength of the Convention — and this relates across to the awareness campaign needed under Article IV. There is little point in raising public awareness if the operations of the Convention are cloaked in secrecy as the benefits accruing from the Convention will not be evident.

Article IX

This recognizes the importance of effective prohibition of chemical weapons. At the Fourth Review Conference, the Final Declaration noted that the Chemical Weapons Convention would enter into force on 29 April 1997. At the Fifth Review Conference it will be appropriate to note that the First Review Conference of the CWC will take place in the following year, 2002, and it will be important to ensure that there are no gaps — or perceived gaps — between the prohibitions under the general purpose criteria in the two conventions. As both conventions address toxins and other substances within the region between chemical and biological agents, it will be beneficial to ensure that the two series of Review Conferences are aware of each other’s developments.

Article X

Under this article, States Parties “undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information

for the use of bacteriological (biological) agents and toxins for peaceful purposes.” At previous Review Conferences there has been much discussion leading to a lengthy statement in the Final Declaration but without significant subsequent action. For example, the Fourth Review Conference “requested the Secretary-General to collate on an annual basis, and for the information of States Parties, reports on how this article is being implemented.” No such reports have appeared, probably, in part or wholly, due to an absence of agreement as to what information should be provided by States Parties to the Secretary-General to enable such a report to be prepared. The period since the Fourth Review Conference has seen continued intensive discussion in the Ad Hoc Group negotiations of specific measures to implement Article X and it is evident that Article VII of the Protocol has successfully identified a range of specific measures that will meet this objective. In addition, it has become evident that there are several initiatives in other fora such as the improvement of biosafety standards worldwide that require the setting up of competent national authorities and a system of facility inspections, which will over time contribute to improved safety, health, prosperity and security. Consequently, it will be necessary to focus under the BTWC and Protocol on those activities for which the future Organization is best fitted to carry out avoiding unnecessary duplication.

Concluding remarks

There is a real opportunity for the Fifth Review Conference to significantly strengthen and enhance the regime for the total prohibition and elimination of biological and toxin weapons through extended understandings enshrined in the Final Declaration. To achieve this strengthening requires the provision of information to all States Parties so that they can judge for themselves the benefits that such extended understandings would bring. An effective Review Conference together with a completed and effective Protocol will set the scene for a safer and more secure twenty-first century in which the international norm against the use of disease as a weapon of war against humans, animals and plants has been significantly strengthened.

Note

- ¹ Malcolm R. Dando and Graham S. Pearson, *The Fourth Review Conference of the Biological and Toxin Weapons Convention: Issues, Outcomes, and Unfinished Business*, *Politics and the Life Sciences*, vol. 16, no. 1, March 1997, pp. 105–26.

Fighting the Proliferation of Biological Weapons: Beyond the BWC Protocol

Michael MOODIE

March 26, 2000 marked the twenty-fifth anniversary of the entry into force of the Biological and Toxin Weapons Convention (BWC). Although the BWC was an important step in post-war multilateral arms control, from the very beginning concerns existed about its effectiveness, particularly its lack of verification or enforcement measures. Those concerns were reinforced during the 1991 Gulf War when members of the international coalition against Iraq confronted an adversary that was known to have pursued a biological weapons (BW) programme.

Following the Gulf War, BWC states parties committed themselves to strengthening the agreement through negotiation of a legally binding protocol that would specify measures to bolster confidence in compliance with the BWC and enhance provisions to share information and technology for peaceful purposes. At the 1996 BWC Review Conference, states parties urged negotiators to conclude their work in time for any protocol to be considered at the next Review Conference, scheduled for 2001.

Will the negotiators meet the 2001 date? Will they agree to a protocol at all? What is the future of the international community's efforts to deal with the scourge of biological weapons?

The outlines of a protocol, but no guarantees

After five years of negotiation, the negotiators appear to have identified the basic elements of a potential protocol. They include:

- mandatory declarations of certain biological-related activities;
- investigations both of unusual outbreaks of disease and of facilities suspected of conducting activities in violation of the BWC;
- on-site visits of various kinds — e.g. clarification of declarations and provision of technical assistance in protocol implementation; and
- measures to promote information and technology sharing and co-operation for peaceful purposes.

While these elements are generally agreed, it remains uncertain that the negotiators will conclude a protocol by 2001 for two reasons. First, considerable disagreement exists on many of the specific details related to these elements, and it is not clear that all of these differences can be bridged.

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Second, even if agreement is achieved in Geneva, concern exists about whether some of the key players, including the United States, will support the resulting protocol.

Almost all of the elements of the potential protocol listed above are subject to disputes — some of them major. Among disagreements of greatest concern are those relating to:

- the future form and operation of biological-related export controls;
- the extent of commitments to sharing and co-operation for peaceful purposes;
- the purpose and effectiveness of certain kinds of visits and related activities;
- the level of detail of the information provided in declarations;
- the prospect for conducting clarification visits at undeclared sites; and
- procedures for initiating a challenge investigation at a facility or in the field.

These disputes might appear arcane. Many participants believe, however, that their outcomes will have a potentially profound impact on the way business is done under the protocol, and hence on its ultimate effectiveness as well as on the future success of the BWC more generally. The outcome of some of these disputes could also have a significant impact on the implementation of other arms control agreements, particularly the 1997 Chemical Weapons Convention (CWC).

The stakes involved in the outcome of these disagreements, therefore, are believed to be higher than they initially appear. Those perceived high stakes are the reason that key issues have remained unresolved for five years and why each side has clung tenaciously to its position. As the 2001 Review Conference comes closer, pressure is building to find some accommodation. While all parties in the negotiations feel that pressure, it does not yet appear to be sufficiently great to identify common ground acceptable to all sides or to promote the concessions needed to achieve mutually acceptable outcomes.

Even if the current disputes in Geneva are resolved, it is not clear that the resulting protocol will receive the support necessary to bring it into effect. Two problems are relevant in this regard. The first is political. The rejection of the Comprehensive Test Ban Treaty (CTBT) by the American Senate has generated concerns that with the American political system's current configuration, the United States will not support any new arms control agreement. Without American participation, any BWC protocol will surely fail, and some opposition to the protocol emerging in Geneva has already surfaced in the Senate. It would be futile to speculate, however, on the final posture of the United States toward a BWC protocol until after the November election. That vote could change the composition of the Senate or the party that controls the White House, or both. The first outcome is unlikely; the Senate balance following the election will probably be little different than it is today (and it is dubious that the Democrats will regain control). Nevertheless, even marginal changes could make a difference. After all, although the Republican Senate did not ratify the CTBT, it did support the CWC in 1997, albeit with some difficult conditions.

More important will be the outcome of the presidential election and the priority a new administration — Republican or Democrat — gives to fighting proliferation and promoting arms control. A Bush administration is not likely to determine whether it will support the outcome in Geneva without conducting a thorough review. A Gore administration may be more inclined to press the current process to a conclusion, but some modifications in its position should not be ruled out.

The second issue is more substantive than political and relates to whether the protocol as it is currently envisioned is appropriate for the world in which it will be applied. The biological sciences and biotechnology have been areas of incredibly rapid scientific and technological advances in

recent years, and, if anything, the pace of change is expected to accelerate. The five years since the beginning of the BWC protocol negotiations have witnessed a remarkable transformation in areas related to the BWC. It is not clear that the protocol adequately captures the dynamism that is the hallmark of today's biology and biotechnology. Rather, one could argue that the structure of the protocol is based on an approach more suitable for an earlier era.

There are several reasons for this view. First, the influence of the approach articulated in the CWC — especially regarding verification — is readily apparent in the draft BWC protocol. What is not so clear is whether that approach has been adequately modified to account for the major differences between activities in biology and biotechnology and those associated with chemistry and chemicals.

Second, many of the measures appear to reflect thinking shaped by the experience of discovering the illegal Soviet BW programme. For more than two decades, Moscow sponsored an illicit BW effort. It was the most extensive BW programme in history, involving dozens of facilities, thousands of people and billions of rubles. Much of the thinking that has shaped specific declaration and investigation procedures in the proposed protocol seems more attuned to dealing with that kind of programme than, say, the problems encountered by the inspectors of the United Nations Special Commission on Iraq (UNSCOM) in their efforts to account for Iraq's BW programme. Most people argue that Iraq's BW effort has been the dimension of Baghdad's pursuit of weapons of mass destruction that UNSCOM has accounted for with least success. How much the protocol is designed to deal with the kinds of problems UNSCOM confronted — which arguably are the most likely non-compliance challenges that would arise — is not clear.

Finally, the rapid changes in biotechnology could greatly affect how business related to biology is conducted, including the development and production of biological weapons. New scientific capabilities that will be seen in the next several years will shape new methods and practices far removed from those of today. If the measures in the BWC are too narrowly defined to focus on today's ways of doing business, will they be sufficiently flexible to be meaningful for tomorrow's?

These questions and concerns must be addressed satisfactorily before the BWC protocol will be endorsed, at least in the United States. If they are not, American Senate ratification of the protocol should not be expected.

If the protocol negotiations fall short, it is important to remember the difference between the talks on the BWC protocol and most other arms control negotiations. The BWC protocol is not designed to fill a void by adding an agreement that addresses a new problem. Rather, it is intended to strengthen an existing instrument of international policy. Therefore, even if the negotiations fail, the BWC will remain in place as a part of the tapestry of inter-related agreements that embody the international community's rejection of weapons of mass destruction.

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Following unsuccessful protocol negotiations, would the BWC have any credibility or utility? The protocol was believed necessary in the first place because the BWC was recognized to be a weak instrument that provided insufficient confidence that the international norm against biological weapons was being adequately maintained. In the wake of unsuccessful protocol negotiations, would the international community, through its actions and practice, discard the BWC? If that happened, would they try to do anything else to stop the spread of biological weapons?

It would be natural if states parties, which have expended considerable time, money and effort to conclude a protocol, became not only frustrated, but despairing about the international community's willingness or ability to do anything effective regarding BW proliferation. Disappointment

would be felt especially keenly by many countries that have invested heavily in arms control as the best means to combat BW proliferation. The letdown that would inevitably follow the collapse of the negotiations would probably make it difficult to mobilize further action in the short term.

The BW problem, however, will not go away. Action will still be required. Successful action will depend, to a great extent, on the leadership of the United States. Washington is the key player in the fight against BW proliferation, and has been long before it came to style itself “the world’s only superpower”. Many countries look to the United States to set the agenda, the tone and the sense of urgency with which the challenge will be attacked.

The United States will only be a successful leader, however, if it stresses co-operation with other countries. The willingness of states to work with Washington will depend in part on how they perceive the American commitment, including to biological weapon arms control. If the United States decides either at the time the final protocol draft is adopted or later that it cannot support the protocol, it must make intensive efforts to find alternative means to show that it is not “throwing in the towel”, turning its back on the rest of the international community, or downplaying the severity of the problem.

Even if Washington does accept a protocol concluded in Geneva, the United States must demonstrate to the rest of the world that much work remains to be done. That work relates not only to ensuring effective protocol implementation, but in a number of other areas as well.

The resulting challenge

With or without a BWC protocol, then, the international community will confront three major tasks in the period following the 2001 Review Conference. The key tasks include:

- sustaining the norm against BW proliferation;
- retaining arms control as a tool of policy; and
- bolstering capabilities to deter and defeat biological weapons.

Successfully meeting these tasks would serve to reduce the uncertainty and risks associated with BW proliferation to manageable levels. In achieving these goals, however, although the United States must take the lead, it will also require other countries committed to the fight against BW proliferation to foster substantial shifts in their perspective.

SHORING UP THE NORM

The norm against biological weapons will surely be strengthened if an effective protocol can be secured. But that result will be limited in time, so there should be no complacency about the need to continue to bolster the norm. Alternatively, the norm will be seen to have eroded if the protocol negotiations produce no result. People will raise questions about how seriously the international community — and the United States in particular if it is held responsible for the failure — views the problem of BW proliferation and how strongly it is committed to addressing that problem. In either case, then, a number of specific steps should be considered to continue to bolster the anti-BW norm.

First, the American political leadership should make clear to the international community the priority that combating BW proliferation will receive in Washington. In particular, the senior leadership must demonstrate that it is willing to invest political capital to get things done. This demonstration will address, at least in part, the view that an absence of American leadership during the protocol negotiations stemmed from lack of interest in the issue among senior American political leaders. Another view has suggested that the negotiations did not receive adequate attention in Washington because BW — at least the global proliferation dimension of the problem, in contrast to domestic bioterrorism — was never high enough on those leaders' list of priorities.

Washington will have to demonstrate its commitment through concrete action; anything else will be dismissed as empty rhetoric. Such action might focus on providing specific assistance packages to friends and allies in regions of BW proliferation concern to improve their defence capabilities, including detection and identification equipment, protective devices, and stocks of medical treatments. More money might also be committed for BW-related intelligence. The point is not so much the inherent value of any action taken, but that there is a commitment to action, leaving no doubt about the seriousness given to the fight against the spread of biological weapons.

A sense that the international community has lost interest or does not give the issue priority could encourage would-be proliferators to take further steps toward BW acquisition and utilization. States must work together, therefore, to insure that there will be a robust international response to BW proliferation, and in particular to violations of the BWC.

The historical record suggests that one should not be optimistic that a strong response to non-compliance would be forthcoming. Many states have been reluctant to take action unless evidence of violations meets very high standards of credibility. Few countries, for example, were convinced by American claims throughout the 1980s that the Soviet Union was not complying with the BWC. Even if they were concerned, they were unwilling to take any action because the evidence to support the American allegations was not deemed sufficient to provide incontrovertible proof of the charge.

Even if the evidence is convincing, governments will balance their response to the violation with other interests that may be in play. The Clinton administration, for example, has not pushed Moscow on resolving lingering issues related to the Soviet Union's violation of the BWC, apparently for fear that it could spark a backlash and jeopardize Russian co-operation deemed necessary for progress on other issues. Trade or other economic interests could also be affected — as appears to be the case for some countries in dealing with Iraq and Iran.

The international community must recognize, however, that whether and how it responds to the next instance of BW proliferation, particularly if that case involves BW use, could be the single most important factor in maintaining a strong norm against biological weapons. Failure to be clear about the gravity that is attached to BW proliferation and the certainty of a severe response should it occur will only promote the perception that engaging in such activities will be increasingly penalty-free. The attitude must be engendered, therefore, that any BW proliferation will provoke the strongest possible response from the international community. It will not be easy, however, to get members of the international community to think in such terms. But they must realize that not being prepared to act decisively in response to an instance of non-compliance could badly undermine future BW non-proliferation efforts.

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Another route for bolstering the norm against BW would be through a robust public information campaign. To ensure the success of a public effort, however, policy-makers must address two key issues. First, how much information should they be willing to provide publicly? The American government makes available only very limited amounts of information about BW proliferation, even regarding programmes in publicly identified countries of concern. Other governments provide even less. In some cases, appropriate information may not exist. In others, intelligence imperatives may constrain what can be said. Those are legitimate considerations; critical information that would endanger national security interests or valuable intelligence assets if made public must be kept secret. But the lack of detailed information makes it difficult to make a convincing case that helps mobilize effective responses. American government publications, for example, give virtually no specifics about the BW programme in Iran, yet American officials seem to expect that everyone will agree with the conclusion that Iran has a BW programme and support the policy steps that flow from that conclusion.

A second question is what balance should be drawn in public discussions between the global proliferation dimension of the problem and the domestic terrorism dimension? Concerned constituencies in the United States and abroad appear to see that balance differently. In particular, it appears that many governments — with some exceptions (such as France and Israel) — do not give the same emphasis to the threat of bioterrorism as does the United States. In the United States, it seems easier to capture attention of key audiences, including Congress, by focusing on the domestic threat rather than global BW proliferation. Even within the United States a discussion has emerged on whether the problem of bioterrorism, given the historical record and current technical and political realities, warrants current levels of investment and attention.

KEEPING ARMS CONTROL IN THE MIX

Particularly if the protocol negotiations produce no result, questions will inevitably be raised about the future credibility and utility of the BWC and the effectiveness of BW arms control. If governments want arms control to continue to make a contribution to the fight against BW proliferation, they would either have to seek a new agreement or find ways other than the protocol to bolster the BWC. The first option is politically unlikely on the heels of unsuccessful talks in Geneva. It would be surprising if any of the participants believed that the negotiation of any new agreement would produce a more positive result.

The remaining choice, then, would be to work with what is available and seek to strengthen the BWC in other areas. One area of emphasis could be the confidence-building measures (CBMs) that were approved at the 1986 and 1991 Review Conferences and which will remain on the books should the protocol negotiations fail. These measures require states parties to provide information regarding biological-related activities, including past offensive BW programmes, current biological defence activities and facilities at which that work is being conducted, unusual outbreaks of disease (to be reported to the World Health Organization), and facilities involved in human vaccine production, among others.

Some people might argue that any attempt to promote better implementation of the CBMs would be a waste of time. Because the measures are deemed politically rather than legally binding, only a relatively small number of countries have provided the information called for in the CBMs even once, let alone on an annual basis. Although the number of states parties participating in the CBMs has steadily increased, the generally poor performance suggests that, left to their own devices, states parties are unlikely to participate more than they have in the past.

The point, of course, is that states parties should not be left to their own devices, and concerned states must work together to promote better participation with existing CBMs. They might also consider promoting any new important CBMs that have been identified during the protocol negotiations as a candidate for adoption on a politically rather than legally binding basis. One suggestion, for example, is a declaration of significant outbreaks of disease that have been reported to human, animal or plant health organizations nationally, regionally or internationally.

Promoting existing or new CBMs, however, should be seen for what it is: a political effort to retain support for the BWC and increase transparency to build confidence among states parties. Even if efforts to foster more participation were successful, the information provided, while helpful, would be far from sufficient in terms of ensuring confidence in compliance with treaty commitments.

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Of course, this is not a problem if the protocol is concluded. Most of the important information now sought in the CBMs will be included in the mandatory declarations.

Even if the protocol is successfully concluded, however, the contribution of arms control to the fight against the spread of biological weapons must be kept in perspective. Arms control is not a panacea, and the provisions of the protocol will represent a modest improvement at best. That contribution could be even further circumscribed if attention to arms control becomes limited to those responsible for implementation of the BWC and the protocol.

One means to avoid this unhelpful limitation is to foster more consultation on BW issues in existing multilateral organizations. NATO's new emphasis on countering proliferation provides one mechanism for engaging in a focused discussion, especially through its new centre designed to promote more information exchange relating to weapons of mass destruction. The Senior Politico-Military Group on Proliferation and the Senior Defense Group on Proliferation could perhaps single out BW for special consideration. NATO's discussion could also be expanded to include other European states. NATO and Russia could have an exchange through the joint council established by the NATO-Russian Founding Act. The Organization for Security and Co-operation in Europe could expand the discussion still further, although the larger the forum, the more difficult it is to keep the discussion focused.

Outside Europe, the Organization for American States and the ASEAN Regional Forum could be encouraged to add an exchange on BW-related issues to their work. It may be difficult to get BW directly on their agendas, however, since few of the countries in either organization perceive a direct BW threat. A broader discussion of proliferation trends that included biological weapons, however, might be given more prominence.

The BWC identifies the UN Security Council as the ultimate mechanism for addressing instances of alleged non-compliance. Expecting the Security Council to play this role effectively in every situation is unrealistic given the political constraints under which it operates. The virtual certainty of a Soviet veto, for example, prevented the United States from asking the Security Council to address its concerns regarding Soviet non-compliance with the BWC throughout the 1980s. Differences among the permanent members regarding Iraq demonstrate how competing political interests can create Council gridlock.

Finding a means to overcome the constraints on effective Security Council action is an issue that transcends the BW problem. But some consideration should be given to exploiting those things the Security Council can do. One of those things is talk, and it might be beneficial for the Council to institutionalize an annual exchange on BW proliferation. This exchange could be a stand-alone exercise, but it is likely to be more palatable if it is cast as part of a broader annual review of the global proliferation situation.¹

ENHANCING NON-ARMS CONTROL MEASURES

As already argued, even if the Geneva negotiations prove successful, the arms control regime will not solve the BW problem on its own. Other tools of policy must also be brought to bear in the fight against BW proliferation. Doing so, however, may not be appealing to everyone. An emphasis on other necessary actions might be considered particularly American, because the United States has adopted an approach that views arms control and other tools of policy as mutually reinforcing. Other countries, however, including some countries in Europe, tend to see arms control and other policy tools as alternatives rather than as complementary measures. Recognizing the limitations of arms control and realizing the need for other action moves them toward options that are distinctly less preferable, including investing already limited resources to purchase more equipment and taking steps to enhance their anti-BW capabilities, entailing perhaps even counterforce options. To the extent that the United States believes it would have to emphasize other capabilities, tensions between Washington and other countries may emerge.

One set of non-arms control tools that could be promoted are legal measures, including criminalization in domestic legislation of activities prohibited by the BWC. The United States and some other countries have already done so. Some states parties to the BWC have been reluctant to make a commitment to passing such legislation, although efforts were made — unsuccessfully — to secure such a commitment at both the 1991 and 1996 Review Conferences. An article in the current draft protocol addresses this issue, but the question of whether states parties will agree to impose criminal penalties through domestic legislation on those caught violating the BWC remains unresolved. Given the historical record, one might be sceptical that focusing efforts in this area will pay dividends, but it remains an area in which progress should continue to be sought.

Intelligence capabilities must not be neglected regardless of arms control outcomes. The information that would flow from protocol procedures will not be, in and of itself, decisive in identifying BW proliferators or confirming suspicions. Together with other information available to the intelligence community, however, such information could fill in key gaps to provide a more comprehensive and comprehensible picture of biological-related activities in countries of concern, which can then guide further intelligence efforts.

Export controls are also likely to come under greater pressure, particularly if the current dispute in Geneva over the issue remains unresolved, as is likely to be the case. As a result, disagreements will play out in other forums. Calls from radical non-aligned countries to disband the Australia Group will continue. The continuation of this dispute is not likely to have an impact on the day-to-day business of the Australia Group, but it will create a more stressful environment in which its members must operate.

The continuing debate, however, may also provide an opportunity for an evaluation of biological export controls over the long term. The way in which technology is developed, produced and disseminated on a global basis has changed significantly in the last several decades. This is especially the case for biological activities and biotechnology. Most of the materials and equipment can be used for both legitimate commercial and medical purposes and making biological weapons. The private sector is responsible for most of the scientific and technical advances, and they are occurring at an incredibly rapid rate. Knowledge and capability will only become increasingly dispersed around the world as biology and biotechnology are applied to more aspects of life.

Under these circumstances, traditional export control systems may become less useful as a means for managing this global technology diffusion in the realm of biology. A major review that

examines the strengths and weaknesses of the current system and possible alternatives could be very helpful.

An important question that emerges after the 2001 Review Conference — with or without a protocol — is the issue of deterrence against biological weapons. Deterrence of biological weapons, however, is in many ways a more complex challenge than nuclear deterrence during the Cold War. This is the case for several reasons. First, by ratifying the BWC the United States has relinquished the option of retaliation in kind, which it retained in the nuclear arena. Second, there is a much wider range of actors that would be the target of deterrence in a BW context, and shaping a convincing message to all of them may prove difficult. Third, the variety of potential BW contingencies that would have to be deterred ranges from “demonstrations” against isolated military units to strategic attacks against cities to terrorist use.

During the Cold War, deterrence was sought exclusively through “deterrence by punishment” inherent in the threat of nuclear retaliation. “Deterrence by denial” was not a major component of the strategy because defence against a nuclear attack was not possible. In the BW arena, deterrence by denial should be a larger part of the strategy because defence is possible. Although not perfect, a combination of active and passive defensive measures poses a series of hurdles to a potential BW proliferator that progressively diminish his chances of success. The more robust those defensive measures, the greater the risk of failure for a potential BW user. The contribution of defensive measures to deterrence is one of the reasons that significant resources are being invested in them.

Counterforce operations also contribute to deterrence by denial. Pre-emptive attack against BW facilities (if they can be identified) is only one form of such operations which extend to the whole range of military targets that a potential BW user might possess.

Even if defensive measures and counterforce operations are enhanced, however, they will not be perfect. There will still be a need to incorporate “deterrence by punishment” into any BW deterrence strategy. How that component of the strategy is implemented, however, is problematic. Less at issue is the question of retaliation with conventional weapons, although there are some debates as to how effective conventional deterrence on its own would be, particularly against hard-core proliferators. But the role of nuclear weapons in BW deterrence is highly contentious. Whether and in what ways nuclear weapons should be a part of any strategy of extended deterrence against biological weapons have been strongly debated.² Ultimately, how the nuclear dimension of deterrence is handled will be a political decision.

Conclusions

The BWC protocol will make a useful contribution to the fight against the proliferation of biological weapons. But there is no certainty that an effective protocol will emerge from the negotiations in Geneva. Even if one does, policy-makers must appreciate that it will not be a panacea and they must take nothing for granted. Successfully fighting the spread of biological weapons will require their recognition of three fundamental realities.

First, even with a new BWC protocol, pressure will continue on the current international norm against biological weapons. However, the norm against BW will not collapse overnight — in fact the new protocol should strengthen it. But whether the norm can be sustained over time will depend on what nations do, and in particular what the United States does, in the face of non-compliance and other problems.

Second, and related, unless the Geneva negotiations can produce a remarkably robust regime, fundamental questions will be raised about the future role of arms control in the biological arena in particular, but more generally as well. Even a modest result, let alone failure of the protocol negotiations, will highlight some of the key objections raised about arms control in the post-Cold War era — that multilateral arms control efforts either cannot be successful or that they produce only “feel good” results without real teeth; that arms control regimes do not address the genuine problem countries; and that many

Bad arms control is worse than no arms control at all, particularly if agreed measures increase uncertainty and instability.

countries in the world are far less committed to arms control than is the United States and some of its friends and allies. Indeed, bad arms control is worse than no arms control at all, particularly if agreed measures increase uncertainty and instability.

The key to maintaining effective arms control, indeed the key to sustaining the norm against biological weapons, will be how the international community responds to violations of the BWC or other incidents. The next use of biological weapons could be a transforming event, totally changing the international context, *unless* the global community responds assertively and effectively. Allowing non-compliant behaviour short of use to persist could also have an insidious impact by eroding commitments and norms over time. Although this is a very difficult issue for countries to discuss before the fact, a dialogue is needed about responses to non-compliance. The reason that the protocol measures were deemed necessary in the first place is the uncertainty taught by experience that all states will live up to their treaty obligations.

Third, because arms control will make only a modest impact in the fight against the spread of biological weapons, other tools of policy are also necessary. Among the most critical capabilities are enhanced intelligence, robust defensive capabilities (both active and passive), and counterforce options needed to provide deterrence. The challenge is not so much identifying the critical tools, but combining them operationally into a genuinely integrated strategy of deterrence and defence.

Notes

- ¹ A variant of this idea was first suggested by Lewis Dunn of Science Applications International Corporation.
- ² For a summary of those arguments, see Michael Moodie, *Chemical and Biological Weapons: Will Deterrence Work?*, Alexandria, Chemical and Biological Arms Control Institute, 1998.

New Technology and Future Developments in Biological Warfare

Mark WHEELIS and Malcolm DANDO

It is very hard for us today to imagine what life was like 150 ago, when there was no understanding of the causes of infectious diseases, nor any effective protection from their ravages. Then, in about a decade near the end of the nineteenth century, scientists of the stature of Koch in Germany and Pasteur in France produced a revolution in medicine by elucidating the microbial basis of infectious disease.¹ This led rapidly to genuinely effective preventive measures, and ultimately to effective remedies, for diseases such as typhoid, cholera, anthrax, plague and others. Yet it was not long — during the First World War — before this new knowledge was being used to attack military draft animal stocks (although with questionable effectiveness).²

This process, whereby new scientific developments in microbiology were used both for the benefit of civil society and in preparation for use in warfare, continued throughout the twentieth century. A number of European countries, as well as Japan, developed bioweapons during the 1930s and 1940s, fuelled in part by inflated intelligence estimates of the biological warfare capabilities of others.³ Japan went on to use biological weapons extensively against China in the Second World War, causing substantial mortality.⁴ In the post-war period at least three countries — the United States, the United Kingdom and the Soviet Union — are known to have had large, ambitious programmes of biological weapons development.⁵ The offensive programmes of the United States and the United Kingdom were discontinued in the 1960s; that of the Soviet Union lasted at least until its break-up. More recently, Iraq is known to have had a small, but mature, biological weapons programme. The facilities and munitions were largely destroyed by UNSCOM, but concerns about its resurgence in the absence of UN monitoring remain.⁶ Intelligence analysts of many countries believe that several developing countries currently have covert biological weapons programmes.⁷

In this context of past and present biological weapons programmes, it is hardly surprising that the background papers produced by States Parties to the Biological and Toxin Weapons Convention (BTWC) for the Review Conferences every five years have shown an increasing sense of concern about the potential impact of the new revolution in biology. This revolution began in the 1970s with a set of techniques known as genetic engineering, or recombinant DNA technology, and has since been expanded by the development of rapid DNA sequencing technology that has led to the field of *genomics* — the extraction of information from complete DNA sequences of organisms, and the

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analysis and cataloguing of that information. A second aspect of this revolution has been the increasingly precise understanding of the physical chemistry of protein folding and of the diversity and mutual interactions of the many thousands of different proteins in the living cell, a field generally known as *proteomics*. Thus a set of immensely powerful experimental and modelling techniques have become available in the last few decades that allow an unprecedented capability to modify living organisms and their products in precise and predictable ways, and to design small molecules to interact in specific ways with proteins in living organisms to alter their functioning in predictable ways. The relevance of these technologies to biological weapons development is obvious; indeed, it has been alleged that the Soviet biological weapon programme employed genetic engineering to create novel agents.⁸

Concerns expressed at previous Review Conferences

The dangers that could arise from new scientific and technological developments in microbiology were well understood at the time that the BTWC was negotiated. As Nobel Laureate Joshua Lederberg told an informal meeting of the United Nations Conference of the Committee on Disarmament on 5 August 1970,⁹ “[t]he potential undoubtedly exists for the design and development of infective agents against which no credible defence is possible, through the genetic and chemical manipulation of these agents”.

As the revolution in genetic engineering got underway it is therefore not surprising that specific concerns began to be expressed at Review Conferences that the new technological developments might have applications to offensive biological weapons development. The first concern articulated was that they might allow the easier production of militarily significant quantities of toxins (by inserting the toxin gene into a bacterium that could be easily grown in industrial quantities).¹⁰

Thus the final declaration of the Second Review Conference in 1986 noted that in regard to Article I, on the scope of the prohibition:¹¹

“The Conference reaffirms that the Convention unequivocally applies to all natural or artificially created microbial or other biological agents or toxins whatever their origin or method of production. Consequently, toxins (both proteinaceous and non-proteinaceous) of a microbial, animal or vegetable nature and their synthetically produced analogues are covered” (emphasis added).

The Final Declaration of the Third Review Conference in 1991 was much more wide-ranging in regard to its concerns about how scientific and technological developments might impact on Article I, stating:¹²

“The Conference, conscious of apprehensions arising from relevant scientific and technological developments, inter alia, in the fields of microbiology, biotechnology, molecular biology, genetic engineering and any application resulting from genome studies, and the possibilities of their use for purposes inconsistent with the objectives and provisions of the Convention, reaffirms that the undertakings given by the States Parties in Article I applies to all such developments. The Conference also reaffirms that the Convention unequivocally covers all microbial or other biological agents or toxins, naturally or artificially created or altered, whatever their origin or method of production” (emphasis added).

By the time of the Fourth Conference of the BTWC in 1996 these concerns had been clearly extended to genomics, the Final Declaration stating:¹³

“The Conference, conscious of apprehensions arising from relevant scientific and technological developments, inter alia, in the fields of microbiology, biotechnology, molecular biology, genetic engineering, and *any application resulting from genome studies*, and the possibilities of their use for purposes inconsistent with the objectives and the provisions of the Convention, reaffirms that the undertaking given by the States Parties in *Article I applies to all such developments*” (emphasis added).

There can be no doubt that the States Parties to the BTWC see the potential impact of new scientific and technological developments as an increasingly serious problem.

Current and near-term threats

It is almost certain, as was demonstrated in Iraq’s recent offensive biological weapons programme, that a proliferator nowadays is likely to attempt initially to weaponize the agents which have been weaponized previously in major offensive programmes, or other unmodified organisms. Thus the “classical” agents developed in the middle of the twentieth century by the United States — anthrax, botulinal toxin, tularemia, etc. — would likely be the first agents of choice. Such agents, having already been proven to be effective, would require limited retesting by the proliferator. However, after the development of a functional biological weapons programme along classical line, it seems probable that agents would be further developed through genetic engineering techniques.

For example, an official American study in 1997 suggested that the following novel agents might be produced:¹⁴

- benign micro-organisms, genetically altered to produce a toxin, venom or bioregulator;
- micro-organisms resistant to antibiotics, standard vaccines and therapies;
- micro-organisms with enhanced aerosol and environmental stability;
- immunologically altered micro-organisms able to defeat standard identification, detection and diagnostic methods; and
- combinations of the above four types with improved delivery systems.

The study then went on to suggest that it was difficult to predict what might happen as a result of further developments in biotechnology, but noted that there were clearly trends in current work which could affect biological weapon possibilities.

Before we go on to review these trends, it is necessary to consider the use of biological weapons from a wider perspective than just the use of highly lethal agents against human beings. Biological agents were used to attack draft animals in the First World War. Anthrax bacteria were also weaponized for use against the German cattle industry by the British in the Second World War, although never used. The fungal agents *Puccinia graminis tritici* (which causes stem rust of wheat) and *Pyricularia oryzae* (which causes rice blast) were weaponized in the American biological weapons programme during and after the war (also never used). Strategic application leading to considerable food shortages was the intended use of these stockpiles.¹⁵ In the current world, use of these and other agents to attack the agricultural sector of a target country would more likely be for economic reasons, and the consequences could include international trade sanctions whose economic impact could far exceed the direct costs of disease mortality and morbidity.¹⁶

Agents to attack the agricultural sector of a target country would more likely be for economic reasons, and the consequences could include international trade sanctions whose economic impact could far exceed the direct costs of disease mortality and morbidity.

In regard to the use of anti-personnel biological agents, it is of course true that highly lethal weapons such as anthrax, plague and smallpox have been weaponized, and that massive strategic attacks producing enormous casualties — essentially use of biological weapons of mass destruction — would be possible. Yet lethal biological weapons could also be used on a smaller scale for tactical purposes. Non-military use of lethal agents could also be undertaken on a range of scales by terrorists. Furthermore, non-lethal biological agents could be used as incapacitants in different types of operations.

In short, when thinking about biological warfare and the potential impact of new technology, we have to keep in mind that we are not just dealing with one particular type of weapon and how it might be changed. We are dealing with many different kinds of potential weapon systems, many different ways they could be used, and, as we shall see, many different ways in which they could perhaps be modified. Biological warfare could have a multiplicity of future trajectories.

The impact of new technology

It would be a profound mistake to see genomics as simply a scientific revolution. It will open up many new civil technological possibilities and form the basis of major industrial investment and growth in the coming decades.¹⁷ Indeed, Jeremy Rifkin has argued that the genomics revolution is at the heart of a linked set of developments which will transform human life:¹⁸

“The Biotech century brings with it a new resource base, a new set of transforming technologies, new forms of commercial protection to spur commerce, a global trading market, ... an emerging eugenics science, a new supporting sociology, a new communications tool ... and a new cosmological narrative to accompany the journey ...”.

It is not necessary to accept the whole of this argument to see that massive reorganizations are taking place in the pharmaceutical and chemical industries to take advantage of the new opportunities for medical drug discovery and profit.¹⁹ In short, the economic opportunities opened up by the new science are likely to ensure that there is ample money available for new technological innovations to be exploited and developed in civil industry. Given the dual-use (civil and military) nature of such technology, there will necessarily be many ways in which biological agents and their products, resulting from civil developments, can be manipulated for military purposes.

What many people understand by genomics at the present time is concerned with simply the structure of the human genome and that of other organisms. In reality, for the biologist, understanding the structure of the genome, though useful and interesting, is but the beginning of the story. The real aim is to have a complete understanding of how the structure works — that is, to have an understanding of *functional* genomics. As one of the scientists involved in the Human Genome Project argued “... the Human Genome Project is best understood as the twentieth century’s version of the discovery and consolidation of the periodic table ...”.²⁰ (Towards the end of the nineteenth century, chemists grasped that it was possible to systematically enumerate all the elements and arrange them in an array in order to show their relationships and, more importantly, their properties and chemical behaviour.) He went on to suggest that “The Human Genome Project aims to produce biology’s periodic table — not 100 elements, but 100,000 genes ... a tree structure depicting ancestral and functional affinities among the human genes...”.

Beyond that, he suggested, there would be a range of new goals. For example:

- systematic identification of all common variants in human genes;
- simultaneous monitoring of the expression of all genes;
- genetic tools for manipulating cell circuitry;
- monitoring the level and modification state of all proteins;
- systematic catalogues of protein interactions; and
- identification of all basic protein shapes.

Thus *functional* genomics will follow on from *structural* genomics and will have the initial aim of understanding the mechanistic details of cellular functioning and how the information encoded in the DNA determines the properties of the organism. This understanding will then allow manipulation for particular human objectives.

One aspect of this scientific and technological revolution very difficult for those of us living through it to grasp is the sheer rate of change. This results both from the opportunities that arise within genomics itself but also from its interaction in complex ways with other scientific and technological developments. Clearly, for example, the revolution in computing and information technology has provided tools essential to handle the vast amounts of information on DNA sequences and protein structures generated and used in the genomics revolution. However, genomics also affects other scientific areas. Within neuroscience, for example, over the last decade there has been an explosion of knowledge about the receptor systems on nerve cells that are of critical importance in receiving the chemical transmitter substances released by other nerve cells. One major annual review stated in 1999²¹ "... Looking back, it is apparent that the past decade has brought an enormous increase in knowledge about the pharmacology and structural biology of receptors ...". In the first edition of the review in 1990 there were thirty pages of data and sequence information on 25% of the receptors catalogued. Less than a decade later, "... 106 pages are required to accommodate current information on approximately 50 receptor ... classes, for which structural information is present for over 90% ...".

It is clear that this level of structural information has only become available because of the application of genomic techniques in neurobiology. It is also clear that "Along with the advent of cloning and expression techniques has come the ability to manipulate gene expression in vivo, which represents perhaps the most powerful method to analyse [receptor] function to date ...".²²

Once a gene has been cloned, it is thus possible to delete it from the genome, or from specific tissues, or to change the level of its expression and then study the consequences. By such means great strides are being made in our understanding, for instance, of learning and memory. But of course these same receptors are potential targets of novel bioweapons, made possible by the same technologies and knowledge that support the rapid advances in biomedical sciences.

New biological weapons

The foregoing is the context against which we have to assess the possibilities for new biological and toxin weapons. The United States report, to which reference was made earlier, suggested that the following trends could be of importance:

“Genetically engineered vectors in the form of modified infectious organisms will be increasingly employed as tools in medicine and the techniques will become more widely available.

Strides will be made in understanding of infectious disease mechanisms and in microbial genetics that are responsible for disease processes.

An increased understanding of the human immune system function and disease mechanisms will shed light on the circumstances that cause individual susceptibility to infectious disease.

Vaccines and antidotes will be improved over the long term, perhaps to the point where classical biological warfare agents will offer less utility as a means of causing casualties.”²³

The last point on this listing, though hopeful from the viewpoint of the potential defence, would also form part of the incentive for a proliferator to consider novel kinds of biological weaponry.

This listing suggests many ways in which new weapons might be developed. It is not difficult to imagine how, for example, as understanding of the immune system develops, and the ability to better redesign proteins comes about, highly specific weapons could become possible to attack the immune system in various ways. For instance, rather than deliberately infecting a target population with a single disease, a biological aggressor could use a toxin to cripple the immune system, and nature would insure that opportunistic infections of many different kinds ensued. Or a novel toxin agent could derange the immune system so that it becomes directly pathogenic itself, causing debility or death through its malfunctioning. Should these strategies seem fanciful, it is worth remembering that one of the classical agents, staphylococcal enterotoxin B (SEB), exerts its incapacitating effects in part via specific effects on the immune system (although this was not understood at the time this toxin was weaponized by the United States). Physiological systems other than the immune system could equally well be targets for such specific attack.

Novel toxins weapons could be normal proteins involved in immune system modulation, discovered through genomic studies, that are toxic due to their unnaturally high concentration, their presence in tissues from which they are normally absent, or the presence in adult tissues of regulatory proteins normally expressed in a specific developmental stage. Alternatively, such toxins could be genetically engineered by combining parts of different proteins, since it is now known that many proteins are composed of several functional domains. For instance, the immunomodulatory domain of a normal regulatory protein could be combined with a domain that targets the protein to a specific tissue (the brain, for example), thus leading to effects that would never be exerted by the normal protein.

Development of novel protein toxins is not the only application of bioinformatics to bioweapon development. The ability to recognize the genes for different classes of protein (e.g. ion channels, surface receptors, etc.) in genomic sequences, and to then predict their three-dimensional shape

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and to infer their function from comparative genomics and proteomics, will shortly lead to a massive increase in our understanding of the ways that the physiology of cells is modulated by external signals. This will in turn allow the rational design of small molecules that bind to such surface receptors and alter their function in predictable ways. Such “designer” chemical weapons could be immensely potent, easy to manufacture and stable. And perhaps most

worrisome, large numbers of such agents will be developed in the course of the peaceful study of cell functioning, and as therapeutic agents. Thus the revolution in biology and medicine, on the brink of which we are now poised, will also open up an immense range of new technologies for novel biological, toxin and chemical weapons.

Manipulation of toxins and bioregulatory chemicals was in fact the subject of a special report produced by the Canadian government for the States Parties to the 1991 Third Review Conference of the BTWC.²⁴ This illustrates very clearly that even a decade ago (ancient history in the context of the pace of scientific and technological advance) there were considerable concerns about how such agents might be developed and used, particularly the possibility of new forms of non-lethal weaponry.²⁵

It is also, unfortunately, possible to imagine new biological weapons with specificity for particular subpopulations of organisms. These kinds of novel bioweapon developed from the application of genomics and proteomics only affect individuals with the particular target protein or structure against which they were designed. In many cases the target would be nearly universal within the species. However, in other cases there might be alternative structures, and only individuals with a particular form of the structure would be vulnerable to the toxic effects of the new weapon. This possibility has led to speculation about “ethnic weapons”—ones that would affect one ethnic or racial group while leaving others untouched. However, among humans the amount of intragroup genetic variation is generally greater than the intergroup variation,²⁶ making such weapons almost certainly highly non-specific. Absent a lucky accident, it is unlikely that an appropriate target for an effective “ethnic weapon” could be found.

Unfortunately, the same is not true for most of the staple crops and domestic animals on which humans depend for food. Especially in the developed world, but increasingly in the developing world as well, agriculture relies on the monoculture of genetically identical plants, or the intensive husbandry of highly inbred animals. This makes crop plants and domestic food animals ideal targets for such genotype-specific weapons. This vulnerability is further enhanced by the high density and huge numbers of individual plants and animals often involved—the ideal conditions for rapid and effective contagion.

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The future

A recent multi-author review of such possibilities ended with the editor’s opinion that:²⁷

“In the race between the defence and the offence, a race so often seen before in military history, the defence seems to be leading for the moment. This being the case, the international arms control community has a small window of opportunity to design and put into place mechanisms to meet the threat of advanced bioweaponry ...”.

It is essential that this opportunity be grasped and that a Protocol designed to strengthen the BTWC be completed in time for the 2001 Review Conference. To fail in that endeavour is to leave the world open to some very frightening possibilities in the early decades of this new century.

Notes

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- ²¹ S.P.H. Alexander and J.A. Peters, *1999 Receptor and Ion Channel Nomenclature Supplement. Trends in Pharmacological Science*, Cambridge, Elsevier Science Ltd., 1999.
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Unilateral or negotiated arms control?

There is again much talk, especially in the United States, about the virtues of unilateral undertakings in the field of arms control. In fact, during the past decades, many unilateral measures have been successfully carried into effect by various governments. They concerned cuts in military expenditures; reductions in the strength of troops and changes in their deployment; cuts in the number of certain weapons or even liquidation of an entire category of weapon (as was the case with the unilaterally decided elimination of the biological means of warfare by the United States in 1969–1970); cessation of the production of nuclear weapon-usable material; moratoria on nuclear weapons testing; freezes on weapon development; undertakings not to use certain means of warfare, including commitments of no first use of weapons of mass destruction; the establishment of nuclear-weapon-free areas; and different other restraints on military programmes. A country embarking on unilateral arms control will usually expect similar (although not necessarily immediate and identical) action on the part of other countries, in particular its potential adversaries.

Unilateral arms control measures may reduce threat perceptions, thereby helping to set aside problems connected with asymmetries in geography, strategies and components of the military establishments of the parties, as well as the sensitive issues of verification of compliance. Unilateral measures are less subject to bureaucratic opposition within the countries concerned than are interstate agreements which often require parliamentary approval. Their other advantage is that they avoid situations, so frequent in the negotiation process, in which each side tries to improve its bargaining position by developing or deploying weapons it would otherwise not have developed or deployed, thus stimulating arms competition instead of abating it.

Reciprocal restraints, assumed without formal treaties — and this can be done in many areas without risk to the security of the nations concerned — may usefully supplement the conventional means of achieving arms control, but they cannot replace them. To become durable, verifiable and enforceable, limitations resulting from unilateral moves — especially those significantly affecting the military potential of states — need to be codified in formal agreements. An agreement defines the range of prohibited activities and gives the force of law to the prohibition. It may include incentives that increase the likelihood of compliance and provide means for the resolution of disputes. It may also neutralize forces within each state which would otherwise urge new arms acquisitions. Moreover,

unlike unilateral undertakings, contractual commitments cannot be easily revoked. If the ban on national missile defence had not been enshrined in an international treaty, it would have been almost certainly annulled, a long time ago, by a simple fiat of the US government. And last but not least, a treaty which gains widespread acceptance sets a standard of international behaviour which even non-parties must take into account.

Jozef Goldblat

Resident Senior Fellow at UNIDIR

Biological Weapons Resource List

Compiled by Joshua MARGOLIN

Institute for the Study of Conflict Ideology and Policy

<http://www.bu.edu/iscip/vol9/Alibek.html>

Dr. Ken Alibek, "Behind the Mask: Biological Warfare", *Perspective*, vol. IX, no. 1, Sept./Oct. 1998; paper on BW development in the Soviet Union.

PBS Frontline

<http://www.pbs.org/wgbh/pages/frontline/shows/plague/>

Contains interviews with BW specialists, regional reports of BW stockpiles and accidents around the world, further readings and a discussion board.

All the Virology on the WWW

<http://www.virology.net/garryfavwebbw.html>

A reference page with links to both independent and governmental BW sites.

Business Executives For National Security

<http://www.bens.org/pubs/bwc.html>

"Assessing the BW Threat".

Center For Civilian Biodefense Studies at Johns Hopkins University

<http://www.hopkins-biodefense.org/>

Seeks to educate about the medical and public health aspects of a bio-attack.

Center for Defense Information's Chemical and Biological Weapons Site

<http://www.cdi.org/issues/cbw/>

Contains overviews of the BWC and CWC as well as relevant articles and position papers on certain topics. Some useful links.

Center for Disease Control and Prevention

<http://www.cdc.gov/>

A searchable site with many articles relating to biological weapon health issues, information on specific diseases, current news and information on publications.

Center for Nonproliferation Studies of the Monterey Institute of International Studies

<http://cns.miis.edu/research/cbw.htm>

Chemical and biological weapons resources including research reports, regional analyses, current news and position papers.

Chemical and Biological Arms Control Institute

<http://www.cbaci.org>

A non-profit corporation established to promote the goals of arms control and non-proliferation, with a special focus on the elimination of chemical and biological weapons. Contains information on current events, a wide variety of publications from research to industry reports as well as information about CBACI's research programmes. Good links.

Chemical and Biological Warfare Project at the Stockholm International Peace Research Institute (SIRPI)

<http://projects.sipri.se/cbw/cbw-mainpage.html>

Contains the history of the CBW project, information on project publications, the BWC text, papers and fact sheets, and some links. Good on-line educational module on CBW.

Federation of American Scientists (FAS) Program on Biological and Toxin Weapons Verification

<http://www.fas.org/bwc/index.html>

Contains working and briefing papers, the BWC text, information on current BW negotiations, an archive of project papers and a number of links.

The Harvard-Sussex Program on CBW (Chemical and Biological Warfare) Armament and Arms Limitation

<http://fas-www.harvard.edu/~hsp/>

Contains a link to back issues of the *CBW Conventions Bulletin* and a basic description of the programme and its goals.

The Henry L. Stimson Center's Chemical and Biological Weapons Nonproliferation Project

<http://www.stimson.org/cwc/index.html>

Contains a great deal of country- and area-specific information, relevant conventions, information on BW agents, and publications.

Joint University of Bradford—SIPRI Chemical and Biological Warfare Project

<http://www.brad.ac.uk/acad/sbtwc>

Great source for following the BWC negotiations as well as good links.

United States State Department

<http://www.state.gov/www/global/arms/index.html>

The tasks of the former United States Arms Control and Disarmament Agency have been absorbed into the State Department, which has created three bureaus—The Bureau of Arms Control, The Bureau of Political-Military Affairs, and The Bureau of Verification and Compliance.

The Acronym Institute

<http://www.acronym.org.uk/dddesc.htm>

Disarmament Diplomacy, the monthly journal of the Institute, contains excellent ongoing coverage of the Protocol negotiations in Geneva and related BW developments.

UNIDIR ACTIVITIES

Visiting Fellowship Programme

To better address issues of regional security and to help promote regional co-operation and development of indigenous research capacity, UNIDIR is extending its Visiting Fellowship Programme to host four researchers from a single region to work together at UNIDIR for four to six months per year. Researchers will be chosen from different countries that form the region of study. The focus of their research will be a particularly difficult aspect of regional security and it is hoped that the resulting research paper will feed into policy debates on the security of their region.

The Visiting Fellowship Programme for the year 2000 will focus on South Asia. In the second half of the year, UNIDIR will welcome its first group of researchers from the region. The fellowships will be allocated on a competitive basis, taking due care to obtain regional representation. The exact details of the research topic will be collectively decided between UNIDIR and the four fellows. In subsequent years, fellows will be attracted from other regions, such as West Africa, Latin America, the Middle East, North East Asia, Southern Africa, Central Europe, East Africa and so on.

For more information about UNIDIR's Visiting Fellowship Programme, please contact:

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Tactical Nuclear Weapons

UNIDIR, in cooperation with the Monterey Institute of International Studies and Peace Research Institute Frankfurt, has launched a research project on the urgent issue of tactical nuclear weapons (TNWs). The project addresses such topics as the definition of TNWs, numbers, the roles of TNWs in various military and political doctrines, and future measures to address the TNW problem. The

project will be carried out over a period of nine months at UNIDIR. The Institute has commissioned papers from experts and has coordinated the research and a research meeting. The preliminary findings of the study were circulated at the May NPT Review Conference. The project will result in the publication of a Research Report in the UNIDIR series and a “UNIDIR Brief” setting out the main findings of the study in succinct form for broad distribution. A number of other publications related to TNWs are in production, to be published in the near future.

For more information, please contact:

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Participatory Approaches to Evaluating the Implementation of Humanitarian Landmine Action

Supported by the Ted Turner Foundation

Evaluating mine action programmes in terms of cost-effectiveness and efficiency has its merits in a donor community concerned with value for money in project implementation. But humanitarian mine action is by definition a qualitative process. It is designed to enhance human security, provide victim assistance and encourage ownership of mine action programmes in affected communities and regions. Traditional evaluation and monitoring techniques do not readily lend themselves to assessments of such qualitative goals and objectives. Participatory monitoring and evaluation techniques (PM&E) are more appropriate to this task. PM&E involves key stakeholders in identifying their needs and assessing the most appropriate options for meeting those needs. Experience has shown that participatory approaches improve the quality, effectiveness and sustainability of donor programmes' actions and outcomes. By placing people at the centre of the monitoring and evaluation process, mine action efforts are guaranteed to empower local communities and encourage local ownership. The proposed pilot study is not only designed to pioneer PM&E approaches within the landmine community, but also to provide a unique opportunity for UNIDIR to help innovate bottom-up approaches to arms control implementation.

For more information, please contact:

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The Costs of Disarmament

In order to present the cost-benefit analysis of disarmament, UNIDIR proposes to take key countries as examples and carefully research what their commitments to disarmament treaties means to them in terms of financial and resource costs. In addition, the project will try to ascertain what each country perceives are the benefits brought to them through their participation in the agreements and whether there is consensus that there is a net gain to the state in question. The aim of the project is to achieve a better understanding of the costs and benefits of disarmament agreements with a view to assisting policy-makers decide how money is spent on such commitments, which budget lines are best structured to handle such spending and how states could approach this aspect of negotiations in the future.

For more information, please contact:

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Peace-building and Practical Disarmament in West Africa

UNIDIR is currently running a project on peace-building and practical disarmament in West Africa. The project is undertaken within the framework of the West African Moratorium on Importation, Exportation and Manufacture of Light Weapons, signed on 31 October 1998 in Abuja (Nigeria). The project aims at strengthening the necessary participation of West African civil societies in the implementation of the moratorium. The broad objective is to build grass-root capacities through research on peace and security issues and to empower ordinary citizens in such a way that civil society organizations become determinant constituencies for disarmament and arms control.

After several tours of the region by the Project Manager, a first collection of papers by selected authors from Sierra Leone is undergoing preparation for publication. A second set of papers focusing on Liberia has been commissioned.

For more information, please contact:

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Project Manager

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UNIDIR Handbook on Arms Control

UNIDIR is producing a handbook that will explain the major concepts and terms relating to arms control. The handbook will be used as both a primer for an audience with limited familiarity with arms control and as a reference for students, scholars, diplomats and journalists who are more experienced in arms control matters.

The handbook will be organized as a thematically structured glossary of approximately 400 terms relating to arms control. Each term is situated within its wider context so that, on the one hand, a specific term can be looked up quickly, and on the other hand, an entire issue can be covered. Cross-references to other terms and concepts will point the reader to relevant related issues. The researcher designing and drafting the handbook will be assisted by an editorial committee consisting of regional and arms control experts.

For more information, please contact:

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Editor

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Fissile Materials

In April 1999, UNIDIR published *Fissile Material Stocks: Characteristics, Measures and Policy Options* by William Walker and Frans Berkhout. The publication is intended to support the Conference on Disarmament in its thinking on the range of options available to deal with stocks of fissile material. Additionally, UNIDIR has commissioned a report on fissile material inventories to provide an up-to-date account of fissile materials, assess national policies related to the production, disposition and verification of fissile materials, and identify facilities and locations which might be subject to safeguards under a treaty.

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UNIDIR Disarmament Seminars

UNIDIR occasionally holds small, informal meetings on various topics related to disarmament, security and non-proliferation. These off-the-record gatherings allow members of the disarmament community, missions and NGOs to have an opportunity to discuss a specific topic with an expert. Recent topics covered include fissile materials, the prevention of war, peace-building in West Africa, reducing nuclear dangers, and biological and chemical weapons programmes. Speakers at recent meetings have included William Walker, Ambassador Jonathan Dean, Michael Krepon and Peter Batchelor.

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DATARIs

In cooperation with SIPRI (Stockholm International Peace Research Institute), UNIDIR has developed an online database of disarmament, arms control, security and peace research institutes and projects around the world. The database can be accessed through UNIDIR's website and institutes can update their information via a password.

If you would like for your institute to be included in DATARIs, please contact:

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Geneva Forum

Together with the Programme for Strategic and International Security Studies of the Graduate Institute of International Studies and the Quaker United Nations Office, UNIDIR organizes an ongoing discussion series called Geneva Forum. Invited speakers deal with specific thematic and/or regional issue. The series targets the local missions and organizations in an effort to disseminate information

on a range of security and disarmament topics. The series seeks to act as a bridge between the international research community and Geneva-based diplomats and journalists.

Now in its third year, the Geneva Forum is being expanded to increase the degree of networking among the academic, NGO and diplomatic communities in Geneva. The enhanced Geneva Forum will bring together the three main sectors in Geneva — disarmament, human rights and humanitarian action — to discuss mutual interest in security and disarmament issues and to further expand the thinking in these communities. This collaborative initiative is being funded by the Ford Foundation and it begins on 1 October.

The focus of the Geneva Forum since 1998 has been the issue of small arms and light weapons. Recently, the first volume of collected Geneva Forum papers has been published (see page 63).

If you would like more information about Geneva Forum, please contact:

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PUBLICATIONS

The Geneva Forum: Seminars on Small Arms, Vol. 1

Since 1997, the Quaker United Nations Office, the Programme for Strategic and International Security Studies of the Graduate Institute of International Studies, and the United Nations Institute for Disarmament Research have collaborated in bringing expert presentations on issues in contemporary arms control and disarmament to the international community in Geneva. These presentations have been addressed to the members of the diplomatic missions in Geneva, and our goal has been to offer high-quality analytical perspectives on contemporary issues in a “user friendly” format related to the policy development needs and possibilities of this particular community.

The focus of the Geneva Forum since 1998 has been the issue of small arms and light weapons. In this small volume, the reader will find the summary results of the seminars that were held between May 1998 and November 1999. We hope, through this volume, to reinforce the experts’ presentations by making them available to a wider audience.

Introduction

Conventional Arms Transfers: Surplus Weapons and Small Arms — *Herbert Wulf*

Illegal Arms in Albania and European Security — *Chris Smith*

Weapons: A Question of Health? — *Robin M. Coupland & David Meddings*

The International Commission of Inquiry (Rwanda) — *Eric Berman*

The United Nations and Small Arms: The Role of the Group of Governmental Experts —
Ambassador Mitsuro Donowaki, Ms Graciela Uribe de Lozano & Ambassador André Mernier

Monitoring the Flow, Availability and Misuse of Light Weapons: A New Tool for the Early Warning of Violent Conflict — *Dr. Edward J. Laurance*

The Norwegian Initiative on Small Arms Transfers: West Africa and Beyond — *Mr. Ole-Petter Sunde*

War, Peace and Light Weapons in Colombia: A Case Study — *Mr. Daniel Garcíá-Peña Jaramillo*

Quaker United Nations Office, the Programme for Strategic and International Security Studies of the Graduate Institute of International Studies and the United Nations Institute for Disarmament Research

Editors

Peacekeeping in Africa: Capabilities and Culpabilities

African regional and subregional organizations have an important role to play in the promotion of peace and security on their continent. The United Nations Security Council has relied on them excessively, however, in large part because it has been reluctant to authorize United Nations peacekeeping operations. Although there is merit to strengthening indigenous capabilities, the issue of whether Africans are prepared for the challenge of assuming primary responsibility for responding to conflicts is another matter. What can African states and organizations do to enhance their peacekeeping capabilities? How can the international community better tailor its initiatives to the needs of African actors? This book answers such questions.

Part I of this book describes challenges to African peace and security and discusses the reasons why the United Nations Security Council has changed its peacekeeping policy. Part II examines African attempts to manage and resolve conflicts on their continent. Part III reviews African peacekeeping experience outside of African regional, subregional and ad hoc initiatives. Part IV describes and analyses efforts made by non-African states to address the deficit. The study concludes with a series of recommendations on how to make current approaches more effective. It provides concrete suggestions for strengthening African regional and subregional efforts and for improving Western capacity-building programmes. It also emphasizes that the United Nations must assume a greater role in both promoting and undertaking peacekeeping on the African continent.

Preface by the Secretary-General

PART I Setting the Stage

PART II African Organizations and Ad Hoc Initiatives

PART III Understanding African Peacekeeping Abilities and Limitations

PART IV Efforts to Develop African Capacities

Conclusion

Annexes and Selected Bibliography

Eric Berman and Katie Sams

ISBN 92-9045-133-5

Sales number G.V.E.00.0.4

The Small Arms Problem in Central Asia: Features and Implications

Although Central Asia has been seriously afflicted by the proliferation, accumulation and misuse of small arms, the region has been largely ignored by the international community. This report attempts to highlight the gravity of the situation in the region by describing the ways in which the small arms problem manifests itself within the Central Asian context. The study specifically focuses on the following issues: the factors generating demand for small arms; the external and internal sources of small arms; the routes through which arms and ammunition are transferred; the various types of small arms in circulation; the humanitarian, political and societal implications of small arms; and finally, the factors hampering the efforts to combat the small arms problem. The study concludes with remarks on the impact of small arms in Central Asia and on possible approaches for their control.

Afghanistan: Two Decades of Armed Conflict

The Cold War Legacy

Small Arms and the Taliban Ascendancy

The Human Costs of Small Arms

The Conflict in Tajikistan

The Civil War 1992–1997

The Sources of Small Arms

The Fragile Peace

Uzbekistan, Kyrgyzstan, Kazakhstan and Turkmenistan: Small Arms and Latent Threats to Stability

Weaponized Societies

Potential Sources of Armed Internal Conflict

Bobi Pirseyedi

ISBN 92-9045-134-3

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West Africa Small Arms Moratorium: High-Level Consultations on the Modalities for the Implementation of PCASED

*A report of the Experts' Meeting and the Civil Society Meeting
23–24 March 1999, Bamako, Mali*

Recognizing the threats to national security posed by the proliferation of small arms and light weapons, West African States have sought to address the issue through a subregional grouping, the Economic Community of West African States (ECOWAS). Inspired by the “security first” approach, on 31 October 1998, in Abuja, all sixteen ECOWAS member states signed the *Declaration of a moratorium on the importation, exportation and manufacture of light weapons in West Africa*.

The Moratorium — commonly known as the West African Small Arms Moratorium — entered into force on 1 November 1998, for a renewable period of three years. This Moratorium is an innovative approach to peace-building and conflict prevention. It is not a legally binding regime but rather an expression of shared political will. In order for the Moratorium regime to be effective, concrete measures need to be adopted to ensure that West African governments remember this political commitment and to mobilize national, regional and international support for its implementation. Located in Bamako, the Programme for Coordination and Assistance for Security and Development (PCASED) is the designated implementation mechanism for the Moratorium.

On 23 and 24 March 1999, ECOWAS, the UN Development Programme and the UN Regional Centre for Peace and Disarmament in Africa hosted high-level consultations with West African and small arms experts to elaborate the modalities for the implementation of PCASED. This report outlines the various discussions that took place within both the Experts' Meeting and the Civil Society Meeting about these priority areas.

Jacqueline Seck

United Nations Institute for Disarmament Research
United Nations Regional Centre for Peace and Disarmament in Africa

GE.00-00475
UNIDIR/2000/2

Small Arms Control: Old Weapons, New Issues

The twenty-nine papers collected in this volume were originally prepared for four regional workshops organized by the United Nations Department for Disarmament Affairs to inform the work of the United Nations Panel of Governmental Experts on Small Arms. These workshops were held during 1995–96. Most of the papers were updated in 1998. Authors include academic, military, governmental and activist experts.

The editorial committee consisted of: Jayantha Dhanapala, Under-Secretary-General for Disarmament Affairs, United Nations; Mitsuro Donowaki, Ambassador and Special Assistant to the Minister for Foreign Affairs of Japan; Swadesh Rana, Chief, Conventional Arms Branch, Department for Disarmament Affairs, United Nations; and Lora Lumpe, Senior Researcher for the Norwegian Initiative on Small Arms Transfers (NISAT) at the International Peace Research Institute, Oslo (PRIO).

The publication is divided into four parts:

Causal Factors and Policy Considerations

The Problem of Small Arms and Light Weapons in Africa

The Proliferation of Small Arms and Light Weapons in Latin America and the Caribbean

The Plague of Small Arms and Light Weaponry in South Asia

Jayantha Dhanapala, Mitsuro Donowaki, Swadesh Rana and Lora Lumpe

Editors

UNIDIR/Ashgate publication

ISBN 0 7546 2076 X

Fissile Material Stocks: Characteristics, Measures and Policy Options

In 1998, on the basis of the Shannon Mandate, the Conference on Disarmament (CD) established an ad hoc committee for negotiating a fissile materials treaty. The treaty is intended to achieve a ban on the production of fissile materials for military purposes in a non-discriminatory, multilateral and internationally verifiably manner. Stocks of fissile materials have accrued transnationally due to armament and disarmament processes, as well as to civil uses of nuclear power. However, very little is known in the public domain about the nature, size and whereabouts of such stocks, and the complexities surrounding their regulation and control. UNIDIR's report on fissile material stocks seeks to begin to redress this problem by providing factual background information on all of these important matters. The report categorizes and quantifies fissile material stocks, and examines the measures which have heretofore been developed regarding their control and management. The report also includes an overview of broad policy options available to states in addressing the stocks issue, which could prove valuable in informing negotiations in the CD.

Fissile material stocks: function, scale and distribution

Characterization by type of inventory

The scale, type and location of fissile material stocks

Measures relating to fissile material stocks: recent developments

Military inventories: continuing absence of international regulation

Transitional inventories: towards regulation and disposition

Civil inventories: the extension of transparency

Policy strategies and options

Stocks and the FMT: possible diplomatic approaches

Possible measures for reducing risks posed by fissile material stocks

Fissile materials and their production processes

International safeguards and physical protection

William Walker and Frans Berkhout

Sales no. G.V.E.99.0.15

ISBN 92-9045-131-9

Sensors for Peace

United Nations peace operations have a tradition of several decades, and their scope and importance has increased markedly since the end of the Cold War. Peacekeeping operations, both of the traditional and the extended type, comprise monitoring tasks as a central part of their mandates. Agreements or resolutions, whether they demand withdrawal behind a cease-fire line, keeping a buffer zone demilitarized, or banning heavy weapons in control zones or safe havens, require that compliance is checked reliably and impartially. The more comprehensive the monitoring, the more likely the compliance. In practice, however, monitoring duties often require the surveillance of such large areas that United Nations peacekeeping units cannot provide continuous coverage. Thus, peacekeeping personnel are permanently deployed only at control points on the roads or areas deemed most sensitive. Minor roads and open terrain are covered by spot-check patrols. This creates many opportunities for infractions and violations.

Unattended ground sensor systems allow all this to change. Unattended ground sensors are suited to permanent, continuous monitoring. They can be deployed at important points or along sections of a control line, sense movement or the presence of vehicles, persons, weapons, etc. in their vicinity and signal an alarm. This alerts peacekeepers in a monitoring centre or command post, who can send a rapid-reaction patrol immediately to the site to confront the intruders, try to stop them, or at least document the infraction unequivocally.

Unattended ground sensor systems generally have not been used in peace operations. Thus, the wider introduction of unattended ground sensor systems in future United Nations peace operations requires fresh study from operational, practitioner, system design and legal perspectives. *Sensors for Peace* is an excellent first look at this timely issue.

Introduction — *Jürgen Altmann, Horst Fisher & Henny J. van der Graaf*

The Use of Unattended Ground Sensors in Peace Operations — *Henny J. van der Graaf*

Questionnaire Answers Analysis — *Willem A. Huijssoon*

Technical Potentials, Status and Costs of Ground Sensor Systems — *Reinhard Blumrich*

Maintaining Consent: The Legality of Ground Sensors in Peace Operations — *Ralph Czarnecki*

Conclusions and Recommendations — *Jürgen Altmann, Horst Fisher & Henny J. van der Graaf*

Jürgen Altmann, Horst Fischer and Henny J. van der Graaf

Editors

Sales No. GVE.98.0.28

ISBN 92-9045-130-0

The Implications of South Asia's Nuclear Tests for Non-proliferation and Disarmament Regimes

On 7 and 8 September 1998, UNIDIR held a private, off-the-record meeting on *The Implications of South Asia's Nuclear Tests for the Non-proliferation and Disarmament Regimes*. This "track one and a half" meeting was designed to address the needs of policy-makers — governmental and non-governmental agents — in their assessment of the impact of the nuclear-weapons tests carried out by India and Pakistan in May 1998. The governments of Australia, Denmark, Italy, Norway, New Zealand and the United States generously sponsored the meeting.

More than fifty people from over twenty-five countries attended the conference. Each participant attended in his or her personal capacity as an expert and not as a representative of a country or a NGO. At the end of this two-day meeting, there was general agreement among participants that neither India nor Pakistan had enhanced its own security or international status by conducting the tests, but that the risk of nuclear war in the region is now greater. Also, it was recognized that the NPT and the CTBT had been in difficulty prior to the tests, although they remained the best solutions available to reduce potential for further conflict and therefore remained crucial. Finally, many participants expressed their concern that if India and Pakistan were rewarded in any way for demonstrating their nuclear capabilities, this may cause some NPT members to reassess their membership in the regime.

International response to the nuclear tests in South Asia was inadequate: there is a need for more coherent and collective action. Participants focused on practical suggestions to policy-makers to reduce the risk of war; to save the non-proliferation and nuclear arms control regimes; and to anticipate the effects of the tests on areas of regional tensions, particularly the Middle East.

The Responses to the Tests

Causes of the Tests

Consequences of the Tests

Regional Security

Consequences for Non-Proliferation and Disarmament

Damage Limitation

Developing the Non-Proliferation and Disarmament Agenda

Conclusions and Policy Options

Main Summary

Prevention of Nuclear War

Saving the Non-Proliferation and Arms Control Regimes

The Effects on Regional Tensions, Especially in the Middle East

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A Peace of Timbuktu: Democratic Governance, Development and African Peacemaking

Mali is admired for two recent accomplishments. The first is the country's transition to democracy, which took place in 1991–1992. This effort included the overthrow of Moussa Traoré's twenty-three year military dictatorship on 26 March 1991 — a process of military and civilian collaboration which fostered national reconciliation, a referendum for a new constitution, and elections which brought to power Mali's first democratically elected president, government and legislature. The second achievement is the peacemaking between the Government of Mali and the rebel movements in the northern part of the country: this process successfully prevented the outbreak of civil war and presents useful lessons in preventive diplomacy for the international community. The peacemaking culminated in a ceremony known as the Flame of Peace, when rebel weapons were incinerated in Timbuktu on 27 March 1996. This study of the events surrounding the uprisings in the North of Mali and the measures which restored peace (and those which will maintain it) is the result of a collaboration between the United Nations Development Programme and the United Nations Institute for Disarmament Research.

This peace process was remarkable for the way in which the United Nations agencies were able to help, discreetly dropping oil into the machinery of peacemaking. For a cost of less than \$1 million, the United Nations helped the Malians to avoid a war, and lit the Flame of Peace. With less than \$10 million, the United Nations became the leading partner of Mali's Government and civil society, in peace-building, disarming the ex-combatants and integrating 11,000 of them into public service and into the socio-economy of the North through a United Nations Trust Fund. The experience shows that not only is peacemaking better than peace-keeping, but that it is much cheaper.

A Peace of Timbuktu includes in-depth coverage of the following topics:

- Mali's History and Natural Environment
- The Build-up to the Crisis in Northern Mali
- The Armed Revolt 1990–1997
- Peacemaking and the Process of Disarmament
- The International Community as a Catalyst for Peace
- Ensuring Continued Peace and Development in Mali
- The Flame of Peace Burns New Paths for the United Nations

United Nations Secretary-General Kofi Annan has written the preface. The book includes maps, texts of relevant documents and laws, and a bibliography, as well as photographs by the authors and peace drawings by the children of Mali.

Robin Edward Poulton and Ibrahim ag Youssouf

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ISBN 92-9045-125-4

Updated second edition now available in French

Curbing Illicit Trafficking in Small Arms and Sensitive Technologies: An Action-Oriented Agenda

Illicit trafficking affects both the stability of states and the safety of their populations. There are no national or regional boundaries delimiting this type of traffic: the problem is truly global and has multifaceted ramifications. Curbing its further development and proliferation calls for a better assessment of the phenomenon and a new way of looking at problems and identifying solutions. In a world of growing interdependence, one of our greatest challenges today is making bold decisions establishing new priorities and starting innovative cooperative ventures, while changing old ways of thinking and working.

Issues and Aspects — *Jasjit Singh*

Weapons of Mass Destruction — *Alfredo Luzuriaga*

Trafficking in Delivery System Technologies and Components — *Genaro Mario Sciola*

Small Arms, Drugs and Terrorist Groups in South America — *Silvia Cucovaz*

Central America and Northern South America — *Daniel Ávila Camacho*

The Role of Manufacturers and Dealers — *Carlos Fernández*

National and International Initiatives — *Wilfrido Robledo Madrid*

African and European Issues — *Stefano Dragani*

Small Arms Trafficking, Drug Trafficking and Terrorism — *Antonio García Revilla*

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Nuclear Issues — *María José Cassina*

Chemical and Biological Agents — *Eduardo Duarte*

A New Agenda for Control Regimes? — *Luis Alberto Padilla*

Final Recommendations — *Eduardo Pelayo, Péricles Gasparini Alves & Daiana Belinda Cipollone*

Péricles Gasparini Alves and Daiana Belinda Cipollone

Editors

English G.V.E.98.0.8

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Spanish G.V.S.98.0.8

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Nuclear-Weapon-Free Zones in the 21st Century

The establishment of nuclear-weapon-free zones (NWFZs) through the initiative of regional parties, approved by the United Nations General Assembly, and endorsed by the relevant external states, is an important contribution to non-proliferation, disarmament and, above all, to international security.

Jointly with OPANAL (The Organization for the Prohibition of Nuclear Weapons in Latin America and the Caribbean) and the Government of Mexico, UNIDIR convened an international seminar on “Nuclear-Weapon-Free Zones in the Next Century” in Mexico City on 13–14 February 1997 — the thirtieth anniversary of the Treaty of Tlatelolco’s opening for signature. This book analyzes the role of the Treaty of Tlatelolco as the first effective expression of a NWFZ in a densely inhabited part of the globe. It also covers other NWFZs (existing or proposed). The relationship between NWFZs and peace processes, as well as cooperation among existing NWFZs, is also noted.

- Towards the Consolidation of the First NWFZ in the World — *Sergio González Gálvez*
 Precursor of Other NWFZs — *Enrique Román-Morey*
 Tlatelolco and a Nuclear-Weapon-Free World — *William Epstein*
 Actual Projection of the Treaty of Tlatelolco — *Jorge Berguño Barnes*
 Major Paradigms of International Relations — *Luis Alberto Padilla*
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 South Asia and the Korean Peninsula — *Kim Chan Sik*
 Towards the Zero Option in Nuclear Weapons? — *Thomas Graham, Jr.*
 A World Free of Nuclear Weapons in the Year 2020 — *Antonio de Icaza*
 The Role Carried Out by the Zones Exempt from Nuclear Arms — *Joëlle Bourgois*
 Strengthening of OPANAL: New Challenges for the Future — *Héctor Gros Espiell*

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Editors

English
 Spanish

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Increasing Access to Information Technology for International Security

The European security landscape is undergoing a profound transformation at present, and there is an increasing need to improve mutual understanding of regional security issues in a rapidly changing world. Institutes and related organizations working in the field of international security have an important role to play in this regard.

This book contains a forward-looking appraisal of how information technology can best serve institutes and the security dialogue. It addresses issues such as how to promote concrete cooperation between research institutes in Europe and North America. Of particular importance is the appraisal of present and prospective demands for cooperative ventures between and among institutes in Europe, the United States and Canada. It also provides insight on how to put together intellectual, human, material and financial resources to foster cooperation, notably in the identification of partners, information needs, connectivity issues and fund-raising strategies. In this respect, a number of innovative recommendations are made in a plan of action to increase cooperation in the late 1990s and well into the next millennium.

- Assessing Partnership Initiatives — *Andreas Wenger & Stephan Libiszewski*
Identifying the Needs of International Organizations — *Anthony Antoine & Gustaaf Geeraerts*
Increasing Interregional Exchanges and Partnerships — *Seyfi Tashan*
Information Needs and Information Processing in International Security — *Gerd Hagemeyer-Gaverus*
A New Approach to Conflict Prevention and Mediation Processes — *Albrecht A. C. von Müller*
A European Information Network on International Relations and Area Studies — *Dietrich Seydel*
Appraising the Status of East/West Connectivity Problems — *Zsolt Pataki*
The Need to Improve Basic East-West Computer Equipment and Supplies — *Christoph Reichert*
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Preparing Tomorrow's Research Establishments — *István Szönyi*
Joint Research Activities: The Bulgarian Experience — *Sonia Hinkova*

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The Transfer of Sensitive Technologies and the Future of Control Regimes

This book comprises papers by fourteen international experts from the diplomatic, military and academic communities in which they identify tomorrow's key technologies in both weapon systems and components, particularly emerging technologies that may become objects of control and constraint eight to ten years hence. This includes conventional weapons and weapons of mass destruction, but special attention is also given to sensor technologies and technologies for the collection, processing and dissemination of information. The authors attempt to identify cooperative technology transfer controls which are likely to forge *new* approaches to solve *old* problems. In this connection, the book presents imaginative and challenging ideas as regards the relationship between technology supplier and recipient states. This publication is essential to those who are interested in following the trends in the transfer of sensitive technologies in the next decade, as well as those concerned with the political and diplomatic issues related to such developments.

Foreword — *General Alberto Mendes Cardoso*
Major Weapon Systems — *Ravinder Pal Singh*
Chemical and Biological Weapons — *Graham S. Pearson*
Nuclear Weapons — *Mark Goodman*
Emerging Sensor Technology: Technology Transfer and Control — *Leonard John Otten III*
The Transfer of Space Technology — *Masashi Matsuo*
Impacts of the "Information Revolution" — *Jeffrey R. Cooper*
Chemical, Biological and Nuclear Weapons Enabling Technology — *Michael Moodie*
Launchers and Satellites — *Mario Sciola*
The Need to Ensure Technology Transfer — *Jasjit Singh*
Prospective Technology Transfer Controls — *Alain Esterle*
The Role of Intelligence Services — *Rodrigo Toranzo*
Intelligence Services and Non-Proliferation Control Instruments — *The Brazilian Intelligence Service*
The Export/Import Monitoring Mechanism (EIMM) — *Frank R. Cleminson*
Summary and Conclusions — *Sverre Lodgaard*

Péricles Gasparini Alves and Kerstin Hoffman

Editors

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Non-Offensive Defence in the Middle East?

Non-offensive defence (NOD) emerged as a proposed remedy to the military security problems of East and West during the latter part of the Cold War. Grounded in the notion of “cooperative security”, NOD is premised on the postulate that states in the international system are better off pursuing military policies which take account of each other’s legitimate security interests than they are in trying to gain security at each others’ expense. Competitive military policies which seek to achieve national security through a build-up of national military means, may well be counter-productive and leave states more insecure. Seeking to procure national military security through a build-up of national armaments raises suspicions as to the purpose of these armaments, which in turn trigger countervailing armament efforts which ultimately lower the level of security for all. By making the defence of domestic territory the sole and clear objective of national military policies, NOD aims to strike a balance between the imperatives of ensuring adequate national military security and of avoiding provocation.

NOD aims towards national military defences strong enough to ensure adequate national military security, but not strong enough to be seen as threatening by others. The provision of adequate yet non-threatening military defence can be highly useful in a region such as the Middle East where political and military confrontations are inextricably linked, and where political settlement in the absence of military security is inconceivable. In the Middle East, NOD could reduce prevailing military tensions and open the way for broader political arrangements on the future of the region.

The introduction of NOD in the Middle East would not require that all Middle Eastern states adopt the same NOD model. Rather, each Middle Eastern state can select the particular NOD model most suitable to its requirements.

Non-Offensive Defence in the Middle East — *Bjørn Møller*

Non-Offensive Defence in the Middle East: Necessity versus Feasibility — *Ioannis A. Stivachtis*

Cooperative Security and Non-Offensive Defence in the Middle East — *Gustav Däniker*

Non-Offensive Defence and its Applicability to the Middle East: An Israeli Perspective —

Shmuel Limone

Bjørn Møller, Gustav Däniker, Shmuel Limone and Ioannis A. Stivachtis

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Building Confidence in Outer Space Activities

This book sets out to clarify some of the prerequisites and modalities of a confidence-building process in outer space. It is the result of efforts undertaken by several experts on outer space matters who examine the role of earth-to-space monitoring in enhancing the safety of outer space activities and preventing the deployment of weapons in that environment. The book concludes by proposing the creation of an International Earth-to-Space Monitoring Network (ESMON) as the most appropriate means to improve both transparency and predictability in outer space activities.

Preface — *Sverre Lodgaard*

Confidence-Building Measures and Outer Space — *Frank Ronald Cleminson*

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Artificial Satellites and Space Debris — *Paolo Farinella*

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Monitoring CSBMs — *Alexandr V. Bagrov*

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Monitoring Scenarios for Different CSBMs in Outer Space — *Péricles Gasparini Alves*

Establishing an Earth-to-Space Monitoring Network — *Péricles Gasparini Alves*

Péricles Gasparini Alves

Editor

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Evolving Trends in the Dual Use of Satellites

Earth-observation, global-positioning, communications and other satellite data are playing increasingly important roles in international security events. This book evolved from discussions by various experts in different areas of satellite technology and applications who met to debate the evolution and implications of such dual-use events. Particular emphasis has been given to providing an understanding of the policy orientation of space agencies and private companies both in traditional and emerging space-competent states. Moreover, the book aims at improving the knowledge of manufacturers, suppliers, users and experts of each others' capabilities and possibilities for cooperation. In this context, attention has been directed to a discussion on the different technical and financial aspects of satellite R&D, as well as the present and prospective markets for satellite data, particularly tomorrow's dual use of satellites.

- Satellite Capabilities of Traditional Space-Competent States — *Masashi Matsuo*
- Satellite Capabilities of Emerging Space-Competent States — *Gerald M. Steinberg*
- Current and Future Remote Sensing Data Markets — *Arturo Silvestrini*
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- No. 37 *National Threat Perceptions in the Middle East*, by James Leonard, Shmuel Limone, Abdel Monem Said Aly, Yezid Sayigh, the Center for Strategic Studies (University of Jordan), Abdulhay Sayed and Saleh Al-Mani, 1995, 109p., United Nations publication, Sales No. GV.E.95.0.24.
- No. 32 *Verification of a Comprehensive Test Ban Treaty from Space - A Preliminary Study*, by Bhupendra Jasani, 1994, 58p., United Nations publication, Sales No. GV.E.94.0.30.
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- No. 21 *Les minorités nationales et le défi de la sécurité en Europe*, par Dominique Rosenberg, 1993, 45p., publication des Nations Unies, numéro de vente: GV.F.93.0.21.

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