THE BIOLOGICAL WEAPONS CONVENTION THREE-YEAR PROGRAM OF WORK 2005

CODES OF CONDUCT FOR SCIENTISTS

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OVERVIEW

At the reconvened session of the Fifth Biological Weapons Convention (BWC) Review Conference in November 2002, the States Parties agreed, as follows

(a) To hold three annual meetings of the States Parties of one week duration each year commencing in 2003 until the Sixth Review Conference, to be held not later than the end of 2006, to discuss, and promote common understanding and effective action on:
   - i the adoption of necessary national measures to implement the prohibitions set forth in the Convention, including the enactment of penal legislation;
   - ii national mechanisms to establish and maintain the security and oversight of pathogenic microorganisms and toxins;
   - iii enhancing international capabilities for responding to, investigating and mitigating the effects of cases of alleged use of biological or toxin weapons or suspicious outbreaks of disease;
   - iv strengthening and broadening national and international institutional efforts and existing mechanisms for the surveillance, detection, diagnosis and combating of infectious diseases affecting humans, animals, and plants;
   - v the content, promulgation, and adoption of codes of conduct for scientists.

(b) All meetings, both of experts and of States Parties, will reach any conclusions or results by consensus.

(c) Each meeting of the States Parties will be prepared by a two-week meeting of experts. The topics for consideration at each annual meeting of States Parties will be as follows: items i and ii will be considered in 2003; items iii and iv in 2004; item v in 2005. The first meeting will be chaired by a representative of the Eastern Group, the second by a representative of the Group of Non-Aligned and Other States, and the third by a representative of the Western Group.

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(d) The meetings of experts will prepare factual reports describing their work.[1]

So 'the content, promulgation, and adoption of codes of conduct for scientists' is to be considered in 2005. It has been agreed that there will be a two-week Meeting of Experts in June and a one-week Meeting of States Parties in December. In late 2004, the Western Group elected the United Kingdom to chair the 2005 meetings. At the time of writing, the United Kingdom is consulting with interested States Parties, and many States Parties are preparing Working Papers which will be presented and discussed at the Meeting of Experts in June.

Therefore, the basis of this paper will be somewhat different from the other papers published in this volume on national legislation, security of pathogens, investigations of alleged use of biological weapons and disease surveillance. In particular, while papers on those issues were able to report on the discussions and draw on the outcomes of the 2003 and 2004 meetings in Geneva,[2] with respect to codes of conduct for scientists we are now moving ahead of the Geneva process.

In the preliminary discussions that have already taken place in the lead-up to the 2005 Meetings[3] several possible outcomes with respect to this issue have been suggested, ranging from a new universally agreed code of conduct based on a consensus-decision of all States Parties, through to the agreement of States Parties of certain elements or themes that may subsequently be drafted into appropriate language by various biological organisations, associations and societies and incorporated into existing codes of conduct.

These preliminary discussions have also considered the substance to be included in the codes of conduct. Suggestions have ranged from a focus on a full awareness of the scientific community of national laws related to biological activities, and full compliance with all such laws (this form of code is sometimes referred to as a code of practice), to a focus on ethical considerations including scientific responsibility when working on certain research projects that may lead to discoveries that could make biological weapons more effective (sometimes referred to as a code of ethics).[4]

Other agencies of the United Nations system have become involved with the issue of codes of conduct, particularly following the attacks in New York on 11 September 2001 and the anthrax letter incidents since late 2001. The Policy Working Group on the United Nations and Terrorism (established by the UN Secretary-General in October 2001) prepared a report in which, as Recommendation 21, stated:

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[1] Fifth 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, *Final Document*, BWC/CONF.V/17 (Geneva, 19 November – 7 December 2001 and 11–22 November 2002) available at <http://www.opbw.org>.

[2] *Report of the Meeting of States Parties, Geneva, 10–14 November 2003*, BWC/MSP/2003/4 (26 November 2003) vol I, available at <http://www.opbw.org>; *Report of the Meeting of States Parties, Geneva, 6–10 December 2004*, BWC/MSP/2004/3 (14 December 2004) available at <http://www.opbw.org>.

[3] See, eg, Scott Spence, *Report of the 21st Pugwash Workshop on the Implementation of the Chemical and Biological Weapons Conventions: The BWC New Process and the Sixth Review Conference* (Geneva, 4–5 December 2004) available at <http://www.pugwash.org>.

[4] For example, genetic modification research on pathogens which have previously been developed for biological weapons purposes, and bio-defence projects which could possibly have applications in the development of an offensive biological weapons capability.

> Relevant United Nations offices should be tasked with producing proposals to reinforce ethical norms, and the creation of codes of conduct for scientists, through international and national scientific societies and institutions that teach sciences or engineering skills related to weapons technologies, should be encouraged. Such codes of conduct would aim to prevent the involvement of defence scientists or technical experts in terrorist activities and restrict public access to knowledge and expertise on the development, production, stockpiling and use of weapons of mass destruction or related technologies.[5]

An Inter-Agency Consultative Meeting was held at the Headquarters of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in February 2003.[6] Within UNESCO, the task of the codes of conduct has been taken up by the already established World Commission on the Ethics of Scientific Knowledge and Technology (COMEST). The Commission was established in 1998 to promote the responsible use of science and technology, a major theme also within the first World Conference on Science held in Budapest in 1999. As an intellectual forum for the exchange of ideas and experience, COMEST can advise policy makers as well as promote dialogue among scientists, decision-makers and communities.[7]

COMEST has established a small group of experts to explore these issues, including how UNESCO can contribute to the debate, recognising that the matter of a code of ethics for scientists is a complex and contentious topic. An interim report is expected to be presented to UNESCO's General Conference in late 2005 that will most likely call for a more detailed study. The deliberations at the Meeting of Experts and Meeting of States Parties of the BWC should assist COMEST, whose deliberations may well focus on the development of a Universal Code of Ethics for Scientists. UNESCO has enunciated such universal codes in its role of standard setting in many areas of human endeavour (eg on the human genome).

It is important to note that the discussions regarding ethics in support of chemical disarmament can also be applied, and perhaps with even greater urgency, to ethical education in support of the BWC. As the boundary between 'chemical weapons' and 'biological weapons' is becoming less distinct, in our view a concerted approach, including chemists and their biological and biotechnology counterparts, offers the greatest benefit in supporting disarmament. Many in the scientific community regard it as an 'educational imperative' for the community of chemical and biological scientists and technologists to develop such codes to support chemical and biological disarmament.[8]

In the specific context of supporting chemical disarmament, the Federation of Asian Chemical Societies (FACS) has recently adopted a regional project with a focus on professional ethics in support of chemical disarmament. The member societies are being invited to participate, through a nominated representative, in the collection and

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[5] United Nations, *Report of the Policy Working Group on the United Nations and Terrorism*, UN Doc A/57/273, S/2002/875, Annex (6 August 2002).

[6] This meeting was attended by Professor John Webb.

[7] Jens Erik Fenstad, Chairperson of COMEST, 'Foreword' in UNESCO, *Report of the Extraordinary Session of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST)* (14–15 May 2004).

[8] See, eg, Jacqueline Simon and Melissa Hersh, 'An Educational Imperative: The Role of Ethical Codes and Normative Prohibitions in CBW-Applicable Research' (2002) 40 *Minerva* 37.

comparison of codes of conduct and the identification of relevant courses and training materials. The goal of the project is to eventually have available appropriate training materials for use in professional development workshops for chemists throughout the region.

In this paper, we do not wish to pre-empt any decisions to be taken by States Parties on the codes of conduct issue during the course of the BWC Meetings in 2005. What we will try to do is provide some practical insights, based on our respective experiences as a government scientist and an academic scientist in various aspects involved with reducing the possibility of biological weapons proliferation and bio-terrorism. These efforts include negotiating measures to strengthen the BWC and advising the scientific community of the risks of inadvertently supporting biological weapons proliferation activities[9] and of the benefit of development of ethics and disarmament in science education.[10]

WHY ARE CODES OF CONDUCT PART OF THE THREE-YEAR PROGRAM OF WORK?

Codes of conduct are not a new concept. For example, the Hippocratic Oath for physicians goes back many centuries. Nor are ethics and scientific responsibility particularly novel within the context of biological weapons. Ethical problems associated with preventing chemical and biological weapons, medical ethics and scientific responsibility were considered in some detail in the 1960s.[11] There have also been codes of conduct developed for scientists, which have included elements associated with professional ethics, plagiarism, and animal experimentation. There has been a recent review of codes of conduct, as they may relate to the BWC work program, which is particularly helpful.[12] So why is the codes of conduct issue part of the BWC three-year program of work?

As discussed earlier in this volume, at least until the 1970s biological weapons were seen as an activity undertaken by the major states (eg the United States and the Soviet Union in the 1960s). However, by the 1980s, at least one developing country (Iraq) was attempting to acquire a major biological weapons offensive capability, and there have been concerns since the 1980s that other countries may also be attempting to develop and weaponise biological agents. In addition, there have been concerns in

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[9] Dr Bob Mathews has provided the chemical and biological communities (within Australia and internationally) with outreach and awareness-raising regarding the dangers of the scientific community providing inadvertent support to chemical and biological weapons proliferation and chemical and bio-terrorism activities.

[10] Professor John Webb has had extensive involvement with a number of national, regional and international scientific societies, including in the development of science-ethics issues, and has also worked closely with UNESCO in the development and implementation of university-level science education policies and programs in developing countries.

[11] See, eg, J H Humphrey and M Meselson, 'Ethical Problems: Preventing CBW' in Steven Rose (ed), *CBW: Chemical and Biological Warfare: Conference on Chemical and Biological Weapons* (1968) ch 13.

[12] Brian Rappert, *Towards a Life Sciences Code: Countering the Threats from Biological Weapons* (Strengthening the Biological Weapons Convention, Briefing Paper No 13, September 2004) available at <http://www.brad.ac.uk/acad/sbtwc>.

recent decades about bio-terrorism, but in particular since 11 September 2001 and the anthrax letter incidents in late 2001.

There has been an increasing globalisation of the biological sciences and biotechnology. As a result, many countries have developed medical, educational and scientific research organisations for the various phases of biological research which support their expanding biotechnology and pharmaceutical industry sectors. Most biological materials (eg seed cultures of pathogens and toxins), production equipment (eg fermenters, centrifuges and freeze dryers), technology and knowledge (ie 'know-how'), and infrastructure (including high containment facilities) that are used by the biotechnology industry to support public health, medicine, pharmaceuticals and agricultural requirements could also be used to support an offensive biological weapons production program.[13]

In the last few decades, there have also been significant advances in the biological sciences and biotechnology. These advances, including advances in genetic engineering techniques as well as in production equipment, have resulted in significant advances in the ability to mass-produce biological agents for legitimate medical, public health and commercial applications.[14] Unfortunately, these advances could also be used to produce biological agents for weapons purposes.

The dual-use characteristics of biological materials and production equipment can make it difficult to distinguish clearly between legitimate activities to support public health, medicine, pharmaceuticals and agricultural sectors (such as the development and production of vaccines and bio-pesticides) from an offensive biological weapons program. Thus a country wishing to develop an offensive biological weapons program would be able to incorporate such a program within its existing biotechnology and pharmaceutical industry so as to obscure its activities. The country could use its medical, education and scientific research organisations for the various phases of biological agent procurement, research, development and production for biological weapons purposes.

A terrorist group seeking to acquire a biological weapon might steal biological weapons from an existing country's biological weapons stockpile; buy biological weapons on the 'black market'; or build 'improvised' biological weapons. Because of the dual-use nature of biological materials, production equipment and know-how, there is a danger of a terrorist group building its own biological weapons, using commercially available dual-use materials and equipment.

Further, because of the high levels of international activity in the biological sciences and biotechnology sector, ranging from collaborative research and development at universities to the high levels of trade in the biotechnology sector, there is a possibility that biological scientists and traders from a country with absolutely no interest in offensive biological weapons, might inadvertently assist a terrorist group in developing offensive biological weapons programs by supplying it with the requisite dual-use biological materials, production equipment, technology or know-how.

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[13] Products include ethanol, fermented beverages, vaccines, antibiotics, enzymes, yeast, vitamins and single cell proteins as a supplement for animal feeds.

[14] For example, using recombinant techniques, toxin producing genes could be spliced to a common host organism, enabling large-scale production (within a short time) of toxic agents which have previously only existed in nature in small quantities.

So to return to our earlier question as to why the codes of conduct issue is part of the BWC three-year program of work, our response is because of the international community's concerns about biological weapons proliferation and bio-terrorism; because of the dual-use nature of biological sciences and biotechnology which means that a scientist could inadvertently support biological weapons proliferation or bio-terrorism activity; and because the developments in biological science and biotechnology could, without adequate oversight and a well developed sense of scientific responsibility, lead to the development of even more horrendous biological weapons.

Thus, in our view, there is a key role for codes of conduct in ensuring that all biological scientists are aware of, and comply with (i) national laws related to those biological projects (materials, equipment, and know-how) which could be misused for hostile purposes; and (ii) the approval and monitoring of all biological research that could be misused for biological weapons offensive purposes.

TWO PRACTITIONERS' PERSPECTIVES ON WHAT MIGHT BE ACHIEVED IN 2005

There will be a two-week Meeting of Experts in June, and a one-week Meeting of States Parties in December 2005. So what might be achieved? As we have noted earlier, we would not wish to pre-empt what might result from the 2005 Meetings. However, to encourage discussion among the Workshop participants, we felt that it might be useful to discuss what the authors, Dr Bob Mathews and Professor John Webb, both (fortuitously) agree should be the way ahead for 2005 and beyond.

Clearly there will need to be a major effort during the Meeting of Experts for a thorough exchange of views in order to develop common understandings of why codes of conduct are so necessary in the present security environment, and common understandings of what codes of conduct, practice and/or ethics should contain, based on the experiences of those States Parties which already have such codes in place within their scientific communities. In our view, it would be a useful outcome of the Meeting of Experts if the United Kingdom was able to prepare a 'Chair Document' which reflected the various views and common understandings developed in the course of the two-week Meeting.

For the one-week Meeting of States Parties in December, we think it would be useful for the Chair to have distilled the major elements from the June Meeting of Experts, including the preparation of a drafted text containing elements that could form the basis of either new codes of conduct, or elements that could be incorporated into existing codes of conduct.

In terms of 'promoting effective action', we see that a particular objective of the December Meeting of States Parties would be to provide encouragement to all BWC States Parties, together with all relevant international, regional and national organisations and biological societies, to work in a cooperative way to actively develop and implement codes of conduct.

We do not think that there will be time in either the Meeting of Experts or Meeting of States Parties for actual drafting. Indeed in our view it would be a distraction from the main tasks which are to 'discuss, and promote common understanding and effective action' to have either the Meeting of Experts or Meeting

of States Parties become a drafting session. In our view, subject to the views of the States Parties during the Meeting of Experts, one approach might be to have the Chair (ie the UK) convene a small drafting group, perhaps two or three States Parties selected by each regional group, who would work closely between the Meeting of Experts in June and the Meeting of States Parties in December, to develop drafting elements (or themes or 'building blocks') that the Meeting of States Parties may then be able to endorse.

Further, we are not convinced of the value of a consensus document flowing from the Meeting of States Parties. Based on our experience, the various scientific communities are much more likely to accept, and take seriously, non-proliferation regulations and a code of conduct related to biological weapons issues if they fully understand the reason for the code and if they have a sense of ownership over it. In other words, if the Meeting of States Parties was to develop a consensus text which States Parties would then be required to 'force down the throats' of the various scientific communities, then it would be more difficult to win the 'hearts and minds' of the relevant scientific communities than if the various biological societies were to be given a set of drafting elements which the societies themselves could then craft into appropriate language (either for addition to an existing codes of conduct or as the basis of a new code of conduct).[15]

ESSENTIAL ELEMENTS OF CODES OF CONDUCT

A comprehensive code of conduct should incorporate aspects of both a code of practice and a code of ethics. The elements we consider to be essential are discussed in the following paragraphs.

A *Codes of Practice*

A major challenge for the scientific community is the possibility of inadvertent assistance being provided to a terrorist group which is seeking to build a biological weapon. As discussed above, the key issue here is the dual-use nature of materials and equipment associated with biological weapons, and the difficulty in recognising when an apparently innocent transaction may have a hostile intent. It is this dual-use nature that gives rise to the possibility of inadvertent assistance or supply of items and technology to a bio-terrorism program. Therefore we see the need for drafting elements to include the following themes:

- that all biological scientists be aware of the potential for misuse of materials, equipment and know-how for biological weapons and/or bio-terrorism purposes;
- that all biological scientists be aware of, respect and fully comply with all national laws and international obligations related to avoiding the hostile use of the biological sciences and biotechnology; and

[15] Such an approach would also overcome translation problems. For example, the words 'bio-containment' and 'bio-security' both have different meanings even within one 'English-speaking' country. Translation without a proper understanding of the intention is likely to cause even greater confusion.

- that all biological scientists recognise the serious penalties for individuals (and if appropriate, institutions) which violate these laws.

B *Codes of Ethics*

Unlike a code of practice, a code of ethics is based on moral principles and a well developed sense of responsibility in individual scientists. A code of ethics should lead to a responsible and ethical culture developing in workplaces within the scientific community, leading to a comprehensive awareness of the types of scientific research that could inadvertently lead to the development of 'more effective' biological weapons (eg genetic manipulation of pathogens which have been considered for former biological weapons offensive programs),[16] and a well developed sense of scientific responsibility within state bio-defence programs.[17]

C *Promulgation and Adoption of Codes of Conduct*

As discussed above, the 2005 topic includes *promulgation* and *adoption* of codes of conduct. Clearly a code of conduct will only support and complement the objectives of the BWC if it is effectively implemented throughout the scientific community (including among senior managers, academics, researchers and technicians).

The responsibility to ensure all relevant individuals are aware of the code of conduct rests with a number of organisations, including governments and biological societies, as well as workplace managers and the teaching staff at educational institutions. We see value in the development and conduct of workshops and seminars for awareness-raising in workplaces, as well as specific courses being undertaken by undergraduate and postgraduate students.

A variety of pedagogical approaches and strategies can be considered, recognising that the goal is different from that of acquiring only technical knowledge and skills. One issue for debate is whether to include such material in a special teaching unit or whether they should be incorporated into academic and professional units. Specific approaches could include the use of case studies, development of project and problem based learning, mentoring by staff, or preferably, a combination of several of these teaching strategies.[18]

WHAT CAN WE DO NOW?

As government officials with responsibilities for effective national implementation of the BWC, things that we can do now include:

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[16] The code of ethics should also raise awareness among the scientific community of the possibility of a work colleague becoming a disgruntled employee who may feel inclined towards malevolent activities.

[17] In our view, all bio-defence projects should have appropriate independent approval and monitoring processes in place to ensure that the work remains fully consistent with national laws and the objectives and specific provisions contained in the BWC.

[18] G L McMullen, 'Educating for Professional Practice' (2003) 6 *Chemistry in Australia* 4; Jeffrey Kovac, *The Ethical Chemist: Professionalism and Ethics in Science* (2004); Simon and Hersh, above n 8.

- considering the various codes of conduct issues in relevant inter-governmental agency meetings;
- discussing the codes of conduct issues in our respective countries among government scientists and the scientific communities (including academics, research institutes, bio-technology companies, as well as representatives of the various biological societies);
- for those States Parties which already have codes of conduct with elements related to biological weapons and bio-terrorism, conducting a review of the effectiveness of the existing codes;
- preparing Working Papers for Meeting of Experts in June;
- commencing outreach to the broader scientific community;
- engaging in discussions with international biological associations, national societies, and the broader biological community, including the form of codes of conduct, practice or ethics that they think would work best and be most effective in their particular workplace environments.

CONCLUDING COMMENTS

A *No One Size Fits All*

We think that it is best to think in terms of a range of options — as stated above, we would not want the Geneva discussions to get bogged down in a long drafting exercise. We would like to see development of code of practice elements and code of ethics elements which could either become a new universal code, a regional code, a national code, a code developed within a particular workplace, or a code to be incorporated into existing codes. As we have indicated above, we are not overly taken by a universal approach to a code. The various stakeholders in the scientific community must have a sense of ownership over the code; no one size fits all.

Irrespective of the outcomes in Geneva, there is much to be done in the meantime, including outreach activities which will be a major step for each country as it commences collaboration with the various stakeholders and associations in developing new codes of conduct, or extending existing codes of conduct.

B *Reviewing Existing Codes*

Various scientific organisations and societies have incorporated biological weapons related elements into their codes of conduct or ethics. For example, Australia's Biotechnology Organisation (AusBiotech) has developed a code of conduct which expresses its opposition to 'the use of biotechnology to make any weapons' and states it 'will not develop or produce biological weapons'.[19] The Australian Society for Microbiology (ASM) has developed an 'ethical code' which 'requires each member to not engage knowingly in research for the production or promotion of biological warfare agents'.

These documents form a useful first step in the development of effective codes. However, in our view, they do not go far enough. For example, the AusBiotech and

[19] AusBiotech, *Biotechnology Industry Code of Conduct* (March 2005) available at <http:/www.ausbiotech.org/code_of_conduct.asp>.

the ASM biological weapons related elements do not refer to the need for members to be aware of the possibility of inadvertent assistance to the development and production of biological weapons through the transfer of dual-use materials, equipment and know-how,[20] nor do they refer to the requirement for all members of the society to be aware of, and comply with, all biological weapons relevant national laws and international treaty obligations.[21] A major problem in the past has been the inadvertent support provided to biological weapons programs. Therefore, all biological scientists must be aware of the potential for misuse, and must take responsibility for the prevention of inadvertent assistance or support for any such misuse, by being vigilant in their professional conduct.

C *Effective Outreach is Essential*

Based on Australia's experience with the operation of export licensing measures on dual-use biological items, an effective national export control and domestic monitoring system based on the obligations under Article III of the BWC (and as elaborated in UN Security Council resolution 1540) will require a sound legislative basis; credible control lists of dual-use items; catch-all control provisions; a workable licensing system; effective implementation and enforcement measures; and information sharing.[22] Domestic legislation is essential, but legislation in itself is not enough. There will need to be a high level of cooperation among a number of government departments, including international policy, export licensing authorities, health and customs.

The ease with which small but significant quantities of biological agents (and even small-scale production equipment) may be transferred means that there will also need to be practical outreach programs among the broader scientific community (including technicians, facility operators and other support staff working in biological institutions) and trading companies to raise (and maintain) awareness of the potential for misuse of biological items and the possibility of inadvertent support to proliferation or bio-terrorism. To be effective, national export control and domestic monitoring systems will require high levels of cooperation between government officials and the scientific community, and a strong sense of responsibility and vigilance within the scientific community. There will be a key role for relevant scientific associations and peak industry groups in this cooperative activity, as well as in the development of codes of conduct for scientists.

Therefore, irrespective of what is decided in Geneva, it will only assist in reducing the risk of biological weapons proliferation and bio-terrorism if all scientists are aware of the possibility that the materials and equipment that they are working with, as well as their know-how, could be misused for offensive biological weapons

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[20] This is a serious 'real-world' problem. For example, much of the materials and equipment obtained by Iraq in the 1980s was obtained through apparently legitimate transactions, and the scientists and traders were not aware that the items were destined for an offensive biological weapons program.

[21] In other words, for a scientist to 'not knowingly' engage in an activity which is prohibited by national law is not good enough.

[22] This includes the provision of scientific and technical support to the licensing and customs officials, as well as information on destinations and end-use of trade in dual-use items.

proliferation or bio-terrorism purposes, and make every effort to fully comply with the various elements of their code of conduct. This will require:

- effective education programs (both undergraduate and postgraduate);
- the conduct of regular refresher courses; and
- extensive outreach activities by government officials and by biological societies themselves.

This will need to be a continuing process because of the changing players and changing technologies in the various biological sectors. It is not an activity that can be done once and then ignored after one has put a ‘tick in the box’.

INTERNATIONAL COMMITTEE OF THE RED CROSS INITIATIVE ON BIOTECHNOLOGY, WEAPONS AND HUMANITY

DOMINIQUE LOYE*

BACKGROUND

New and ongoing advances in the life sciences and biotechnology hold great promise for humanity. These advances include greater understanding of the human organism, as well as the means to manipulate basic life processes more effectively. Potential benefits include cures for diseases, new vaccines and increases in food production. However, some of these same advances are inherently dual-capable. Their misuse may make biological weapons more effective, cheaper, more difficult to detect and hence more attractive to those with hostile intent, in violation of international law.

The International Committee of the Red Cross (ICRC), in keeping with its mandate to protect and assist victims of armed conflict, is particularly alarmed by the potential hostile misuses of advances in life sciences. Warnings of what could go wrong with such advances are profoundly disturbing. The ICRC believes these merit reflection at every level of society. Testimony from governments, United Nations agencies, scientific circles, medical associations and industry provides a long list of existing and emerging capacities for misuse. These include:

- deliberate spread of existing diseases such as typhoid, anthrax and smallpox to cause death, disease and fear in a population;
- alteration of existing disease agents rendering them more virulent, as has already occurred unintentionally in research on the 'mousepox' virus;
- creation of viruses from synthetic materials, as occurred recently using a recipe from the Internet and gene sequences from a mail order supplier;
- creation of novel biological warfare agents for use in conjunction with corresponding vaccines for one's own troops or population (this could increase the attractiveness of biological weapons);
- new methods to covertly spread naturally occurring biological agents to alter physiological or psychological processes of target populations such as consciousness, behaviour and fertility, in some cases over a period of years; and
- production of biological agents that could attack agricultural or industrial infrastructure (even unintended release of such agents could have uncontrollable and unknown effects on the natural environment).

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The life processes at the core of human existence must never be manipulated for hostile ends. In the past, scientific advances have all too often been misused. It is essential that humanity acts together now to prevent the abuse of biotechnology.

For many centuries poisoning and deliberate spreading of disease has been the subject of public abhorrence. Such activities are proscribed in diverse cultures, religions and military traditions and have become part of customary international humanitarian law. These prohibitions are also formalised in international rules including the 1925 Geneva Protocol,[1] 1972 Biological Weapons Convention[2] and the 1993 Chemical Weapons Convention.[3]

'BIOTECHNOLOGY, WEAPONS AND HUMANITY'

Prompted by the concerns described above, the ICRC issued a public appeal in September 2002 entitled 'Biotechnology, Weapons and Humanity'.[4] This appeal is aimed at governments, industry, academic researchers, health professionals and scientific circles, as well as civil society in general. It is intended to promote the implementation of practical measures to prevent the use of the life sciences for hostile purposes, and to improve synergy between them.

In particular the appeal calls upon all political and military authorities to strengthen their commitment to the international humanitarian law norms prohibiting the hostile use of biological agents, and to work together to subject potentially dangerous biotechnologies to effective controls in order to minimise the risk of hostile use. This includes:

- becoming parties to the 1925 Geneva Protocol and the 1972 Biological Weapons Convention (if they have not already done so), encouraging states which are not parties to become parties, and lifting reservations to the 1925 Geneva Protocol on use;
- resuming with determination efforts to ensure faithful implementation of these treaties and develop appropriate mechanisms to maintain their relevance in the face of scientific developments;
- adopting stringent national legislation, where it does not yet exist, for implementation of the 1925 Geneva Protocol and the 1972 Biological Weapons Convention, and enacting effective controls on biological agents with potential for abuse;

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1 *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare*, opened for signature 17 June 1925, 94 LNTS 65 (entered into force 8 February 1928).

2 *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction*, opened for signature 10 April 1972, 1015 UNTS 163 (entered into force 26 March 1975).

3 *Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction*, opened for signature 13 January 1993, 1974 UNTS 45 (entered into force 29 April 1997).

4 Further information on the ICRC's 'Biotechnology, Weapons and Humanity' initiative is available at <www.scienceforhumanity.org>. The full text of this the appeal is reproduced in Annex 11 to this volume.

- ensuring that any person who commits acts prohibited by the above instruments is prosecuted;
- undertaking actions to ensure that the legal norms prohibiting biological warfare are known and respected by members of armed forces; and
- encouraging the development of effective codes of conduct by scientific and medical associations and by industry to govern activities and biological agents with potential for abuse.

THE 'WEB OF PREVENTION'

The different stakeholders in the field of biotechnology must live up to their responsibilities and take appropriate measures. All these measures are necessary but they will be insufficient if they are implemented without congruent and complementary steps taken by others. The ICRC describes this approach as the 'web of prevention'. Development of this concept stemmed from the realisation that there is a very low general level of awareness among individual and institutional actors in the professional life sciences about the taboos against biological and chemical weapons. This is worrying because these scientists, physicians, policymakers and related business people have particular responsibilities to uphold taboos against poisoning and deliberate use of disease as they are the primary agents of these advances.

The 'web of prevention' concept is intended to help relate the legal and ethical norms to individuals and institutions in the life sciences by properly informing them of the *risks*, *rules* and *responsibilities* associated with preventing hostile use of their advances. This knowledge should help to motivate them to objectively assess and reduce risk in this sphere, and to take action accordingly.

Such engagement requires three main phases of action from actors in the life sciences:

(a) acknowledging that minimising risks of hostile use of advances in the life sciences is of concern to actors in the life sciences, and is part of their responsibility;
(b) identifying and implementing the necessary actions within their own sphere of influence that will contribute to risk reduction and complement actions being taken in other spheres; and
(c) ensuring that actions in the life sciences are known amongst, and complement, the actions of others.

Indicative examples of practical measures in the life sciences that can contribute to a 'web of prevention' include:

- scrutinising all research with potentially dangerous consequences and submitting it to rigorous and independent peer review;
- adopting professional and industrial codes of conduct aimed at preventing the abuse of biological agents;
- ensuring effective regulation of research programs, facilities and biological agents that could lend themselves to misuse, and supervising individuals with access to sensitive technologies;
- supporting enhanced national and international programs to prevent and respond to the spread of infectious disease; and

- ensuring that awareness of the risks, rules and responsibilities associated with preventing poisoning and the deliberate spread of disease are part of laboratory or other training for all personnel.

Depending on the context, many other practical measures may be applicable. Such individual preventive actions may not result in major changes on their own. But they can add up to be very effective in combination and do not have to be complex or expensive if they reflect the particular circumstances of a situation. The benchmark is that they should be effective in the context to which they are applied.

DOCUMENT ON 'PRINCIPLES OF PRACTICE'

In the context of the current deliberative 'experts' meetings on the Biological Weapons Convention, in 2005 States Parties to that Convention will discuss the topic of content, promulgation, and adoption of Codes of Conduct for scientists.

With regard to this discussion the ICRC is certainly not in a position to tell actors in the life sciences *how* in detail they have to develop such Codes and *how* they have to implement them. However, in order to facilitate the understanding about the link between the legal and ethical norms on one hand and best practices on the other hand, the ICRC has developed a document on 'Principles of Practice' relating to life sciences.[5] This document has been written in consultation with a number of experts in science and policy matters. It covers the following areas:

(a) conflict of interest;
(b) legal responsibilities;
(c) diligence;
(d) governance of research and publication;
(e) a culture of transparency;
(f) increasing speed of advances;
(g) a 'web of prevention';
(h) voicing concern;
(i) specific characteristics of biological weapons;
(j) 'dual-use'; and
(k) diffusion of materials and technologies.

To date, the document has received an encouraging level of interest from different scientific groups who are discussing and/or developing Codes of Ethics, Codes of Conduct or Codes of Practice. These groups include the InterAcademy Panel on International Issues (IAP), the International Council for Science (ICSU), the Royal Society of the United Kingdom and the National Academies of the United States.

[5] International Committee of the Red Cross, 'Preventing Hostile Use of the Life Sciences: From Ethics and Law to Best Practice' (2004), reproduced in Annex 12 to this volume.

ROUNDTABLES ON PREVENTING HOSTILE USE OF THE LIFE SCIENCES

As part of its outreach to the professional life science community, the ICRC has organised, and continues to organise, a series of roundtables around the world intended to engage representatives of this community and encourage them to take practical action within their own domains in order to minimise the risk of hostile use of the life sciences.

In 2004 the ICRC co-organised the first of these roundtables in London in partnership with the British Red Cross. Around 40 representatives of government agencies, the pharmaceutical and biotechnology industries, university researchers, scientific and medical associations (including the Royal Society and the British Medical Association) participated in the one-day meeting. Experts in various fields (and covering scientific, medical, legal, commercial and governmental perspectives) delivered short panel presentations in order to prompt discussion. A key outcome of the roundtable discussion in London concerned the importance of creating and enhancing a culture of responsibility among life scientists in order to reduce the risks of hostile use of their work.

A second roundtable is to be held in Moscow with the Russian scientific community on 2 June 2005. The third roundtable will be a regional Asia Pacific event and is to be held on 20–21 September 2005 in Kuala Lumpur. Similar to the roundtable in London, the invited participants (up to three experts per country) should cover the different perspectives which have to be considered in relation to preventing the hostile use of advances in the life sciences. Based on the presence of relevant scientific expertise and/or biotechnology industry (whether existing or emerging) around 12 countries of the Asia Pacific region have been chosen.

The aim of such roundtables is to foster discussion among a range of experts from science, law, health, government and industry on issues related to strengthening their commitment to the international humanitarian law norms which prohibit the hostile uses of both chemical and biological agents, and to ensuring that potentially dangerous knowledge and technology coming out of advances in the life sciences are subject to effective controls. This involves:

(a) promoting and disseminating awareness of the international humanitarian law norms against hostile uses of the life sciences to key actors in the region;
(b) promoting discussion and further thinking about the need for practical measures by individuals and institutions within the life sciences to ensure they uphold these norms, using the ICRC's public appeal as a tool to engage them;
(c) obtaining their feedback on the ICRC public appeal, and learning more about how they perceive their responsibilities and application of these norms in different areas of the life sciences;
(d) promoting dialogue between the different areas (eg scientific, commercial, public health, governmental departments) as an aid to reducing risk; and
(e) helping the ICRC to understand their concerns and problems in order to improve our communication of the appeal's messages to the life science community.

SUMMARY OF THE PANEL DISCUSSION ON CODES OF CONDUCT

Following the presentations on the development and implementation of codes of conduct for biological scientists by Dr Bob Mathews and Professor John Webb, and the role of codes of conduct in preventing the misuse of pathogens and toxins by Dominique Loye from the International Committee of the Red Cross, there was a panel discussion led by Professor John Webb. Issues raised during this panel discussion included:

- the types and content of codes of conduct;
- the role of codes of conduct in assisting the scientific community in supporting the objectives of the Biological Weapons Convention (BWC); and
- various outreach and awareness-raising activities among biologists and the broader scientific community to ensure that codes of conduct are effective.

Participants also considered possible outcomes for the 2005 BWC Meetings in Geneva. Preliminary discussions suggested a range of possible outcomes, from a new universal code of conduct to be agreed by States Parties, through to agreement by States Parties on certain elements or themes that may subsequently be drafted into appropriate language by various biological organisations, associations, societies or institutions and incorporated into existing codes of conduct.

Participants considered that the various scientific communities are much more likely to accept, and take seriously, the non-proliferation regulations and a code of conduct related to BWC issues if they fully understand the reasons for the code and if they have a sense of ownership over the code. To win the 'hearts and minds' of the relevant scientific communities, it was considered that the best approach may be for the BWC States Parties to develop a set of elements or themes which the scientific societies and workplaces could then craft into appropriate language to add to their existing codes.

THE PURPOSE OF CODES OF CONDUCT

Suggestions ranged from a focus on:

- full awareness by the scientific community of national laws related to biological activities and full compliance with all such laws (sometimes referred to as a code of practice); to
- ethical considerations, including scientific responsibility when working on certain research projects that may lead to discoveries that could make biological weapons more effective (sometimes referred to as a code of ethics).

This raised the question as to whether there should be two separate codes (that is, a code of practice and a code of ethics), or a single code of conduct containing 'code of practice elements' and 'code of ethics elements'.

It was considered that 'no one size fits all'. Rather, participants considered that the best approach may be a range of regional, national, societal and workplace codes. It was also considered that it would be useful as a first step to review existing codes of

conduct, as it may be better to further develop existing codes rather than create new codes.

PROMULGATION AND ADOPTION OF CODES

Participants considered that, to be effective, there must be a cooperative outreach effort. Some participants commented on the various responsibilities of governments, scientific societies, workplace managers, and teaching staff at educational institutions. Participants noted that, to be effective, all relevant individuals in the workplace (ie not just 'scientists') including senior managers, academics, researchers, technicians, and potentially research sponsors, must 'own' the codes.

It was considered that promulgation of codes could be achieved through a combination of seminars conducted in workplaces; specific courses at undergraduate and postgraduate level, including the use of case studies; development of problem-based learning; and mentoring by staff. Participants agreed that the development and promulgation of codes of conduct should be seen as an ongoing process, rather than an activity that you could do once, and then 'tick the box'.