Convergence of biology and chemistry:

Implications for the regime of the Convention.

Including the potential role of Other Chemical Production Facilities

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* The views expressed are those of the author, and do not necessarily represent the views of the Australian Government or any other entity.
Outline of Presentation

1. Introduction
2. The CWC in a Changing World
3. The need to ‘Tend’ (take care of) the CWC
4. Convergence of biology and chemistry
5. Implications for the Verification Regime
   Including OCPFs and Schedule of Chemicals
6. Reviewing advances in S&T – Meetings of Experts (?)
7. Concluding Comments
The CWC in 1993: A Revolutionary Treaty

- A comprehensive and non-discriminatory Convention
- Compulsory national declarations of relevant industrial and military activities.
- Routine inspections of declared activities, including CW destruction and industry activities.
- Challenge inspection - any site, at short notice.
- Investigation of alleged use.
- Assistance (when under threat of chemical weapons)
- International Cooperation (to facilitate ‘peaceful purposes’)
- Establishment of ‘Organisation for the Prohibition of Chemical Weapons’ (OPCW)
But we live in a Changing World …

• Since 1992, we have witnessed many interesting and unpredictable changes, including:

  – Changes in international relations,

  – Changes in the security environment,

  – Revolution in information / communications,

  – Increased globalisation of chem/ bio industries,

  – Discoveries / developments in life sciences
    • Including convergence of biology and chemistry.
However....

The CWC provisions are comprehensive, flexible and adaptable, designed to enable the Convention to remain relevant:

• based on implementation experience;
• within the changing political and security environments;
• with advances in science and technology,
• changes in industry practices.

The CWC text was not ‘set in stone.’
A Comprehensive, Flexible Regime

- Broad definition of ‘chemical weapons’;
- ‘Understandings’ of terms/provisions agreed by Annual Conferences of States Parties (CSP);
- Decisions taken by Annual CSP;
- Verification – to be focused and fine-tuned by OPCW Technical Secretariat;
- Scientific Advisory Board – reports to OPCW DG
- Five-yearly Review Conferences.
- Simplified Amendment Procedure (Technical change);
- Formal Amendment Procedure.
‘The means by which these agreements survive and adapt to changing conditions after they enter into force deserve as much attention as the negotiations that produced them in the first place. They cannot simply be left to fend for themselves.’


(US Ambassador for Disarmament, Geneva, 1980-81)
Convergence of biology and chemistry

A rapidly growing understanding by scientists of the fundamental chemistry of living systems, through interdisciplinary teams using more sophisticated equipment and experimentation.
Convergence of biology and chemistry

These advances result in:

• Increasing possibilities of using biologically mediated processes (catalysts, naturally occurring organisms and genetically modified organisms) for the production of chemicals (biosynthesis);

• Development of chemical synthesis of replicating organisms (small viruses so far);

• Recombinant DNA technology that allows replacement of the original genome in bacterial cells with synthetically produced genomes, to produce bacteria with new capabilities (synthetic biology).
Convergence of biology and chemistry

These advances promise major benefits, including:

• Improved medical / health care;
• More efficient food production;
• Renewable energy resources; and
• Pollution management.
Convergence of biology and chemistry

Implications for the CWC:

POSITIVE:
• Improved methods of protection against chemical weapons, including:
  – Detection;
  – Personnel protective equipment
  – Medical countermeasures
  – Decontamination
  – Improved methods of analysis relevant to IAUs

NEGATIVE:
• Advances could be mis-used for production of large quantities of toxic chemicals, including toxins and bioregulators, for use as chemical weapons.
Convergence: The Chemical & Biological Threat Spectrum

 Agents not found in nature

 Classical CW  Emerging CW  Bioregulators  Toxins  Genetically manipulated BW  Traditional BW

 Mustard Nerve Agents  HydrogenCyanide Phosgene  Toxic industrial, pharmaceutical and agricultural chemicals  Peptides  Botulinum Saxitoxin Ricin  Modified/tailored bacteria and viruses  Bacteria Viruses Rikettsia

(Prepared by: Chemical Defence Establishment, UK, 1982)
Implications for the Verification Regime
Including OCPFs and Schedule of Chemicals

• We don’t know yet, but we must keep a close watch on developments

• Review has been commenced by SAB
  – Recommendation for a new Temporary Working Group

• Review will need input from biological community
  – including expertise in industrial scale biotechnology production

• May result in recommendations for ‘Technical Changes’ to Schedules (eg toxins, bioregulators), or ‘Technical Changes’ to OCPF regime.
Frequency of Review by States Parties

- Broad definition of ‘chemical weapons’;
- ‘Understandings’ of terms/provisions agreed by Annual Conferences of States Parties (CSP);
- Decisions taken by Annual CSP;
- Verification – to be focused and fine-tuned by OPCW Technical Secretariat;
- Scientific Advisory Board – reports to OPCW DG
- Annual ‘CWC Meetings of Experts (MX)’
- Five-yearly Review Conferences.
- Simplified Amendment Procedure (Technical change);
- Formal Amendment Procedure.
Annual Meeting of CWC Experts??

- Based on valuable experiences in Biological Weapons Convention Meetings of Experts (MX) in Geneva
- The aim of the BWC MX is to discuss, develop common understandings, and then to promote effective action on particular topics selected by BWC States Parties.
- MX is composed of government experts, and can include scientific societies, academic experts, representatives from relevant International Organisations, industrial representatives, etc.

- Is there a role for a similar informal MX process for the CWC States Parties?
A ‘Straw Man’ Proposal for CWC MX

1. Each CWC CSP develops particular S&T topic(s) to be reviewed in the following year.

2. Relevant representatives (e.g. from SAB, IUPAC, IAP, Industry Associations, etc) requested to prepare a factual review of topic(s).

3. A panel of representatives discuss the factual review of topic(s) at a subsequent CWC MX with government experts:
   – The MX to be open-ended, with diplomats made welcome.

4. The MX (perhaps limited to States Parties) then considers implications for the CWC of the advances in the topic(s).

5. The MX report is prepared by the Chair, reflecting the IAP report and the views of government experts:
   – N.B. Not necessarily a consensus report.

6. The MX Chair Report is made available to CWC States Parties prior to next CSP, for States Parties to consider any actions required, and select topic(s) for the following year.
Concluding comments ...

The provisions enabling the CWC to adapt, based on early implementation experience, and to the changing world, were well designed.

With rapid advances in S&T, including ‘Convergence’, States Parties should be reviewing S&T more frequently than once every 5 years.

Valuable lessons from BWC Annual MX process.

Benefits in greater engagement of biological communities (including Inter Academy Panel and biotech / industry) in OPCW experts meetings.

Benefits of combined meetings of CWC and BWC Experts to discuss ‘Convergence’ issues.
A Final Thought...

Unless CWC Member States respond to these challenging issues, the CWC risks becoming outdated and not able to provide the most effective response to the threat of chemical weapons in a changing world.

Any Questions?