



ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS

Working together for a world free of chemical weapons

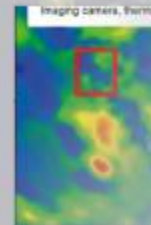
BRIEFING BY THE CHAIRPERSON OF THE
SCIENTIFIC ADVISORY BOARD ON THE
ACTIVITIES OF THE BOARD AND ITS REPORT
FROM THE 22ND SESSION

WEDNESDAY 7 OCTOBER 2015

14:00-15:00

OOMS ROOM

Dr Christopher Timperley





Chemistry and diplomacy



Every aspects of the world today – even politics and international relations – is affected by chemistry

Linus Pauling (1901-1994)



Chemists do not usually stutter. It would be very awkward if they did, seeing that they have at times to get out such words as methylethylamylophenylium

William Crookes (1832-1919)



Science and the CWC

Science underpins the Chemical Weapons Convention, and it is those who are trained in science and engineering – here at the OPCW and in national jurisdictions – will continue to contribute to our common objective to rid the world of chemical weapons, and to prevent them from ever re-emerging.

As we promote science and engage technical stakeholders, we must work to address and allay the concerns that policy-makers might have about the implications of scientific developments.

This means that our policy-makers must seek and engage with scientists and the advice they provide.

Director-General Ethical Guidelines Workshop opening remarks, 17 Sept 2015



Science thinking

Policy

Diplomacy thinking





Science and the CWC

Science and technology underpins many Articles of the CWC

<u>Article</u>	<u>Examples</u>
Art II	definitions
Art III	declarations: accurate and complete
Art IV + V	destruction methodologies
Art VI	sampling & analysis
Art VII	effective national implementation depends in part on S&T knowledge/awareness/outreach
Art IX + X	investigations, assistance, challenge, inspections
Art XI	outreach on S&T

Science and technology is central to OPCW's future priorities



SAB composition

Chairperson

Christopher Timperley (United Kingdom and Northern Ireland)

Vice-chairperson

Cheng Tang (Peoples Republic of China)

Departing members

Alejandra Suárez (Argentina)

Djafer Benachour (Algeria)

Michael Geist (Germany)

Muhammad Zafar-Uz Zaman (Pakistan)

Slavica Vučinić (Serbia)

William Kane (USA)

New members

Ponnadurai Ramasami (Mauritius)

Isel Pascual Alonso (Cuba)

Christophe Curty (Switzerland)

Farhat Waqar (Pakistan)

Zrinka Kovarik (Croatia)

Robert Mikulak (USA)



Outline

Recommendations from RC-3

Temporary working groups

On-going scientific activities

Verification report recommendations

Science and technology

Future plans and intersessional work



RC-3 recommendations

Monitor science and technology developments

Build extra laboratory and analysis capabilities

Build expertise, training/knowledge management

Become more active in education and outreach

Examine developments and advise on verification

Provide support to assistance and protection



The Scientific Advisory Board

The states that negotiated the Convention on Chemical Weapons (CWC) knew that in order for the Convention to remain relevant and avoid the problems of earlier chemical weapon treaties, the CWC would have to be adaptable. Both the Convention and its implementing body, the Organisation for the Prohibition of Chemical Weapons (OPCW), are intended to adapt not only to shifts in the international environment and the changing needs of States Parties, but also to respond to scientific and technological developments. To this end, the Convention foresees that the States Parties should 'review scientific and technological developments that could affect the operation of this Convention'. To provide States Parties with the expertise needed for such a review, Article VIII, paragraph 21 (h) of the CWC mandates the establishment of a Scientific Advisory Board (SAB) to monitor developments in science and technology and assess their impact on CWC implementation. The OPCW Conference of the States Parties (see Factsheet 3 on OPCW structure) addressed this issue at its second session in December 1997 when it instructed the Director-General to establish such a body.

Structure and Function of the Scientific Advisory Board

The SAB is a subsidiary body of the OPCW, enabling the Director-General to provide specialised advice in science and technology to OPCW policy-making bodies and Member States. The SAB reports to the Director-General, who then makes the Board's reports available, alongside his own response, to the Executive Council and the public. Every five years, the SAB prepares a comprehensive report for submission to the review conference. The SAB held its first meeting in 1998 and meets once or twice per year at the OPCW's headquarters in The Hague.

The SAB consists of 25 members, each of whom is an expert in one or more technical fields relevant to the Convention. SAB members serve in their individual capacity as independent experts. States Parties nominate candidates, and the Director-General makes the final selection, keeping in mind the need for geographical balance. Members are appointed for three years and can serve two consecutive terms. Members are drawn from universities, industry, defence organisations and other institutions. Only citizens of OPCW member states are eligible for SAB membership. Every year the SAB elects a Chair and Vice-Chair from its members.

Cooperation is important. The SAB coordinates with the OPCW Technical Secretariat, which provides support for SAB activities. The board invites experts from other international organisations, scientific institutes and industry associations to make presentations at meetings of the SAB and its temporary working groups (TWGs). Members of the SAB and its working groups also share their views with the scientific and industry communities by presenting at conferences.



Members of the Scientific Advisory Board in 2014

Funding for SAB activities comes from the OPCW's regular budget and voluntary contributions. A trust fund for the Board was set up in 2006. 14 States Parties and the European Union have contributed.

Past and Present Temporary Working Groups	
Chemical Weapons Destruction Technologies	1999 – 2000
Reviewed technologies for the destruction of chemical weapons.	
Equipment Issues	1999 – 2000
Examined issues related to equipment for inspections and on-site monitoring of chemical weapon destruction operations.	
Analytical Procedures	1999 – 2000
Addressed alternative inspection methods, the use of analytical equipment belonging to the Inspected State Party and possible inclusion of non-scheduled chemicals in the Central OPCW Analytical Database.	
Ricin Production	1999 – 1999
Examined how and at what stage production of ricin should be reported.	
Adamsite	1999 – 1999
Determine whether adamsite is an acceptable riot control agent and criteria to be taken into account when declaring holdings of adamsite.	
Low Concentration Limits for Schedule 2A and 2A* Chemicals	2000 – 2000
Examined the concentration level at which mixtures of chemicals containing Schedule 2A and 2A* chemicals should be regulated.	
Biomedical Samples	2004 – 2007
Examined whether the OPCW Laboratory and designated laboratory network can develop the capacity to analyze biomedical samples.	
Sampling and Analysis	2007 – 2012
Examined issues relating to the collection and analysis of samples for verification purposes.	
Convergence of Chemistry and Biology	2011 – 2013
Examined the risks and benefits that rapid advances in life sciences pose to the Convention.	
Education and Outreach	2012 – 2014
Examined how to raise awareness of the Convention and build relationships between the OPCW and the scientific community, the academic community, chemical industry, international organisations and other groups.	
Verification	2013 – 2015
Examined verification technologies, methodologies and equipment.	

Issues for the SAB

Science and technology underpin almost every aspect of the Convention, from complex verification procedures to the CWC's most fundamental definitions. Science, technology and world events can change rapidly, requiring new insights and understandings to ensure the OPCW and the Convention can respond. Therefore, the SAB is called upon to provide guidance on a wide range of issues. Some of the topics on which the Director-General has recently asked the SAB for advice include medical treatment for blister and nerve agents, riot control agents (RCAs), new approaches to verification, and education and outreach in science and technology. The SAB also provides expert advice on any proposed changes to the Schedules of Chemicals (see Factsheet 7).

In addition to its ongoing activities, the SAB has temporary working groups to provide recommendations on specific issues within specific timeframes. The Director-General establishes these working groups in consultation with the SAB. The SAB Chairperson appoints one member of the SAB to chair each TWG, and the Director-General appoints additional experts to serve as members of the group based on suggestions from OPCW member states and the SAB. Only citizens of member states are eligible to be members of a working group. At the end of the group's mandate, it submits a report of its findings to the SAB and Director-General.

Since its creation, the SAB has had eleven TWGs on the following topics: the convergence of chemistry and biology; verification; education and outreach; sampling and analysis; ricin production; analytical procedures; on-site monitoring equipment; chemical weapon destruction technologies; adamsite; low concentration limits for Schedule 2A chemicals; and biomedical samples. See the summary table on the left for details.

As of October 2014, the Board has one active temporary working group, on Verification. Two other temporary working groups, on the Convergence of Biology and Chemistry and on Education and Outreach, ended their mandate in 2013 and 2014, respectively. TWG and SAB reports are publicly available on the SAB website at www.opcw.org/about-opcw/subsidiary-bodies/scientific-advisory-board.

OPCW

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Revised: 31 October 2014



Temporary Working Groups



Convergence

14 experts; chair Mr. Bill Kane

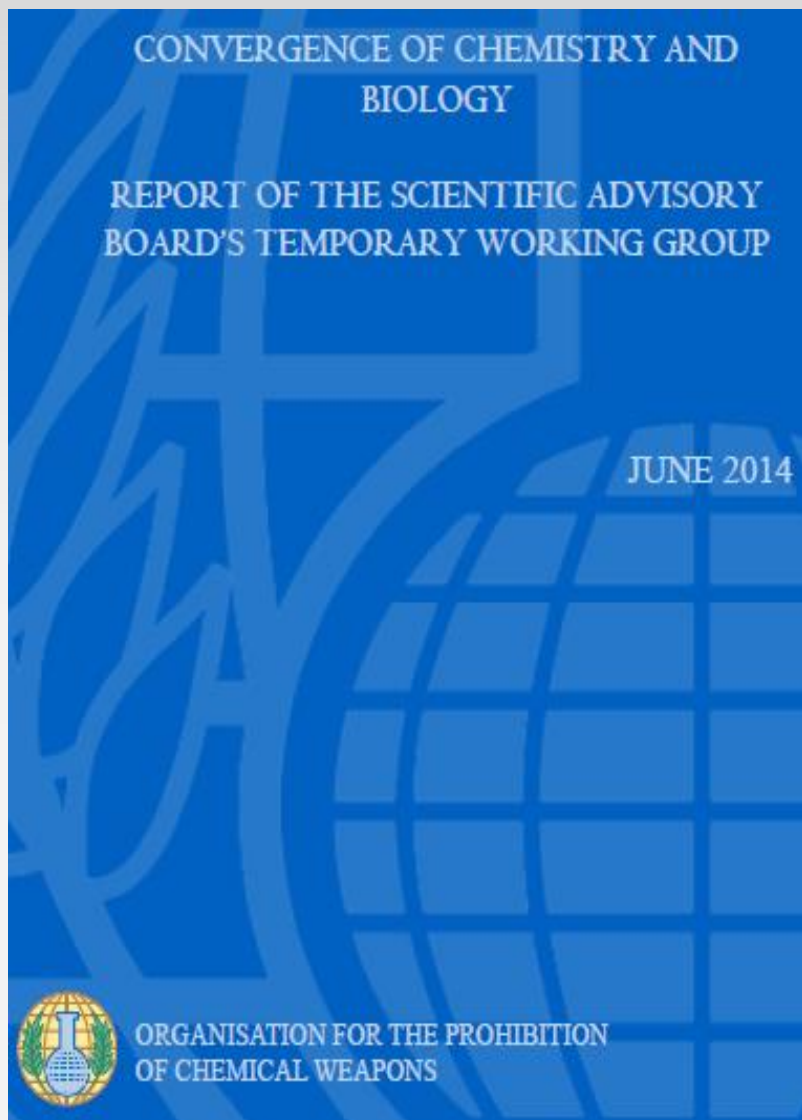
Report published in June 2014



Education and Outreach

11 experts; chair Prof. Djafer Benachour

Report published in November 2014



Convergence TWG

Chemicals being produced increasingly by biomediated processes (e.g. fermentation)

Estimated ~10% of chemical production volume will use such processes by 2020

Have been rapid advances in chemical synthesis of molecules of biological origin

SAB recommended that ‘produced by synthesis’ describes any process for producing a chemical (as applies to Part IX of the Verification Annex, in the context of declarations required for OCPFs)



Findings

New production processes, combined with developments in drug discovery and delivery, could be exploited to produce toxic chemicals

Increasing overlap between topics of interest to both the CWC and BWC (e.g. toxins) and contacts should be maintained with the BWC

Convergence is being used for improved chemical and biological warfare medical countermeasures, new decontamination and detection/diagnostics methods, and for improving protective clothing

Recommended that science at the crossroads of chemistry and biology is tracked closely to pick up any step changes that might impact on the CWC and BWC, including on verification of the CWC




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Spiez CONVERGENCE

Report on the first workshop
6–9 October 2014

 Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Office for Civil Protection FOCP
SPEIZ LABORATORY

 **CSS**
ETH Zurich

Spiez CONVERGENCE

Involved experts from NGOs, the SAB, academia, industry and policy sphere

Invited experts presented on 12 topics

Concluded that the life sciences are advancing at an unprecedented pace

And that the expansion of data and knowledge will lead to non-linear progress in future, which will outpace CWC and BWC treaty review cycles

Recommended that advances in the life sciences should be monitored constantly



**Advances in Design and Use of Microbial
Production Systems:
A Workshop for the BWC Community**

Sunday, 9 August 2015

**Hotel N'vY
Salle Sausalito
Rue de Richemont 18
Geneva, Switzerland**

Microbial systems can be used to produce therapeutic proteins, as well as chemical molecules such as drugs and biofuels. The possible applications of bio-based production continue to expand, enabled by advances in the ability to manipulate genes and metabolic pathways through synthetic biology. The symposium will explore how the design and scale-up of microbial systems is changing the nature of biological and chemical production, what factors are helping to drive this expansion, and what implications these developments may have for the implementation of the BWC.

Goals:

1. Learn how the use of bio-based systems is affecting production models in chemical and biological industries, major drivers, and global trends.
2. Learn about progress in the development of integrated design tools and remote platforms that can help streamline the process of creating microbes with the ability to efficiently produce biological or chemical products of interest.
3. Discuss how trends and developments might impact the Biological Weapons Convention.

Microbial production of chemicals

**Launched in 1993,
the IAP network includes
107 member academies
representing 97 countries.**

**SAB Chairperson
participated in
the workshop**

**Committed to making the voice
of science heard on issues
of crucial importance to the
future of humankind.**

**THE
ROYAL
SOCIETY**



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EDUCATION AND ENGAGEMENT:
Promoting a Culture of Responsible Chemistry

**FINAL REPORT OF THE SCIENTIFIC ADVISORY
BOARD'S TEMPORARY WORKING GROUP**

NOVEMBER 2014



ORGANISATION FOR THE PROHIBITION
OF CHEMICAL WEAPONS

Education and outreach TWG

Recommendations

E&O with respect to responsible use of science relevant to the CWC should remain a core activity of OPCW

An ongoing expert advisory group on E&O should be established to help OPCW fulfil its mandate for E&O

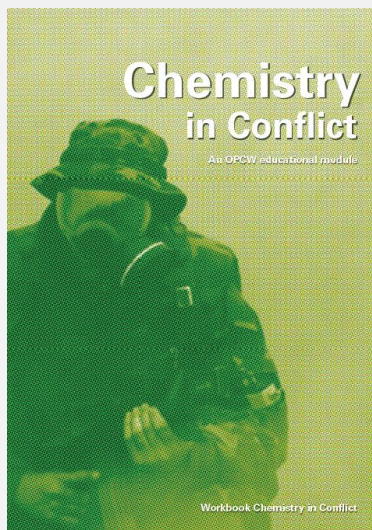
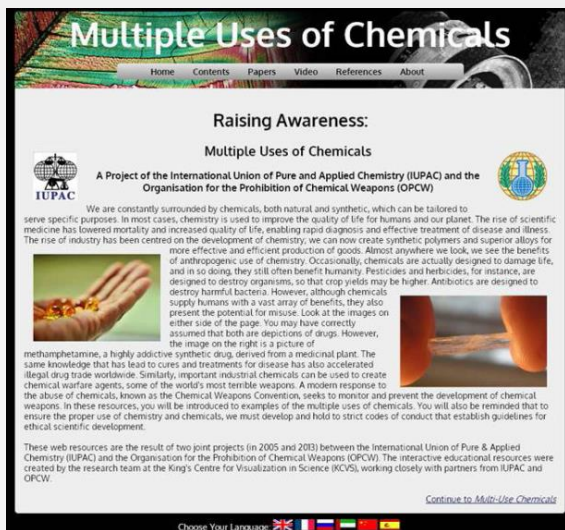
Until such time as the expert advisory group is appointed, the current TWG should continue its work



Education & outreach

SAB members participated in the
“Education for Peace” conference on
22-23 September 2014

Examples of educational materials
from Education and Outreach TWG :



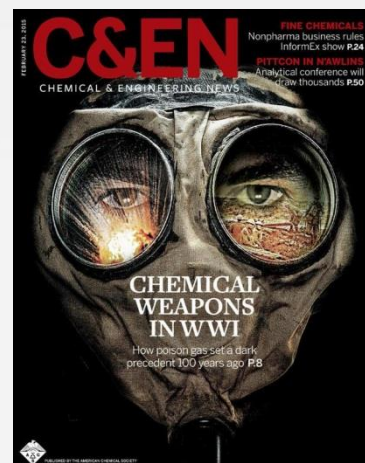


National societies

American Chemical Society
Recognised OPCW for promoting
chemistry in service of peace

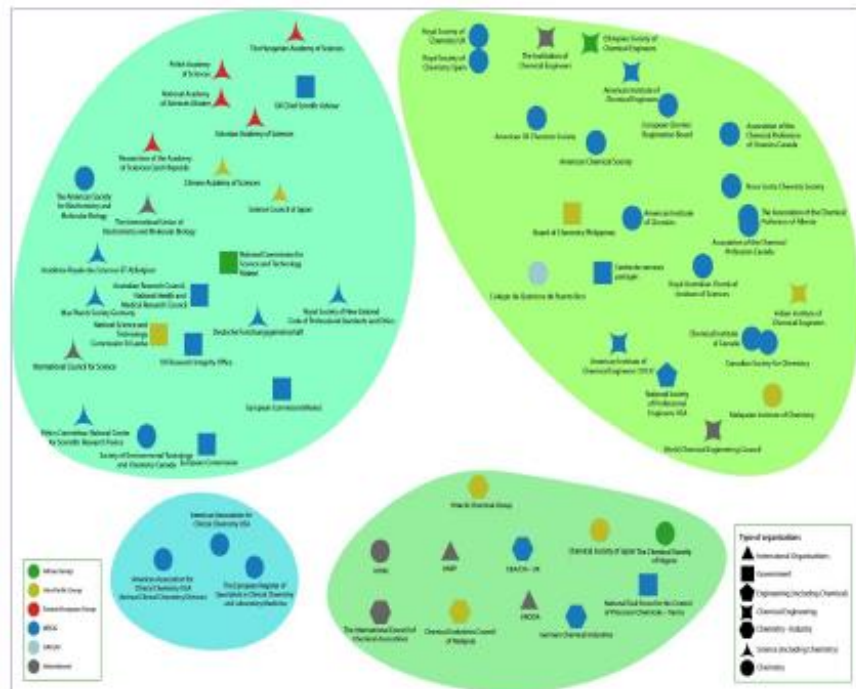
National Academy of Sciences USA
Collaborating on workshops on S&T
developments relevant to CWC/BWC

Royal Society of Chemistry UK
Interest in Article XI programmes
(through OPCW International
Cooperation Branch)





**Report of the Workshop on Guidelines for the practice of
Chemistry under the Norms of the Chemical Weapons
Convention**



Organisation for Prohibition of Chemical Weapons
22 May 2015



Ethical Guidelines



1st workshop on 11 March 2015

2nd workshop on 17 September 2015

Chairperson : Prof. Alejandra Suarez

**Text of “The Hague Ethical Guidelines”
finalised and available at www.opcw.org
in the Science and Technology section**



The Hague Ethical Guidelines

The Hague Ethical Guidelines

Applying the norms of the practice of chemistry to support the Chemical Weapons Convention

The responsible practice of chemistry improves the quality of life of humankind and the environment. Through their many peaceful uses, such as in research and industry, chemicals play an essential role in this improvement. However, some chemicals can also be used as chemical weapons or to create them, and these weapons are among the most horrific in the world.

The 1993 Chemical Weapons Convention (CWC) embodies the powerful international norm against chemical weapons, requiring its States Parties "never under any circumstances: (a) To develop, produce, otherwise acquire, stockpile or retain chemical weapons, or transfer, directly or indirectly, chemical weapons to anyone; (b) To use chemical weapons; (c) To engage in any military preparations to use chemical weapons; (d) To assist, encourage or induce, in any way, anyone to engage in any activity prohibited to a State Party under this Convention." The task of destroying the world's declared stockpiles of chemical weapons is close to completion, but the threats that the use of chemicals as weapons pose to global security have not yet been eliminated.

As destruction of the remaining chemical weapons continues, a concerted effort is needed to prevent their re-emergence. This includes training and raising awareness among chemistry practitioners, defined as anyone trained in chemistry as well as others dealing with or handling chemicals. Their support is needed so that production and use of chemicals is accompanied by recognition of the responsibility to ensure that they are applied solely for peaceful and beneficial purposes. Fortunately, ethical standards established by the global chemistry community already provide a foundation. Building on that foundation, a group of experts from 24 countries from all regions of the world convened to define and harmonize key elements of ethical guidelines as they relate to chemical weapons based on existing codes.¹

Such codes are primary ways through which the community's ethical standards are addressed. The key elements presented in this text should be incorporated into new and existing codes in order to align with the provisions of the CWC. A code need not mention chemical weapons or the CWC to support its basic goals, and provisions may need to be tailored for particular sectors or circumstances, while still reflecting the fundamental values. Taken together, "The Hague Ethical Guidelines" provide the key elements that should be applied universally.

¹ "Code" is used as a general term and includes the full range of such documents, from aspirational statements such as the Hippocratic Oath to codes that are enforceable, for example as part of a practitioner's terms of employment.

The Key Elements

Core element. Achievements in the field of chemistry should be used to benefit humankind and protect the environment.

Sustainability. Chemistry practitioners have a special responsibility for promoting and achieving the UN Sustainable Development Goals of meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Education. Formal and informal educational providers, enterprise, industry and civil society should cooperate to equip anybody working in chemistry and others with the necessary knowledge and tools to take responsibility for the benefit of humankind, the protection of the environment and to ensure relevant and meaningful engagement with the general public.

Awareness and engagement. Teachers, chemistry practitioners, and policymakers should be aware of the multiple uses of chemicals, specifically their use as chemical weapons or their precursors. They should promote the peaceful applications of chemicals and work to prevent any misuse of chemicals, scientific knowledge, tools and technologies, and any harmful or unethical developments in research and innovation. They should disseminate relevant information about national and international laws, regulations, policies and practices.

Ethics. To adequately respond to societal challenges, education, research and innovation must respect fundamental rights and apply the highest ethical standards. Ethics should be perceived as a way of ensuring high quality results in science.

Safety and Security. Chemistry practitioners should promote the beneficial applications, uses, and development of science and technology while encouraging and maintaining a strong culture of safety, health, and security.

Accountability. Chemistry practitioners have a responsibility to ensure that chemicals, equipment and facilities are protected against theft and diversion and are not used for illegal, harmful or destructive purposes. These persons should be aware of applicable laws and regulations governing the manufacture and use of chemicals, and they should report any misuse of chemicals, scientific knowledge, equipment and facilities to the relevant authorities.

Oversight. Chemistry practitioners who supervise others have the additional responsibility to ensure that chemicals, equipment and facilities are not used by those persons for illegal, harmful or destructive purposes.

Exchange of information. Chemistry practitioners should promote the exchange of scientific and technical information relating to the development and application of chemistry for peaceful purposes.



The Hague Ethical Guidelines

Participants of 2nd Workshop



Guidelines endorsed by :

Professor Muhamad Abdulkadir (Indonesia)
Professor Jasim Uddin Ahmad (Bangladesh)
Professor Abeer Al-Bawab (Jordan)
Professor Fernando Albericio Palomera (Spain)
Professor Jan Apotheker (The Netherlands)
Professor Mahdi Balali-Mood (Islamic Republic of Iran)
Professor Djafer Benachour (Algeria)
Dr Mark Cesa (United States of America)
Professor Al-Nakib Chowdhury (Bangladesh)
Dr Philip Coleman (South Africa)
Professor Dr Hartmut Frank (Germany)
Professor David Gonzalez (Uruguay)
Professor Alastair Hay (United Kingdom of Great Britain and Northern Ireland)
Mr Steven Hill (United States of America)
Professor Dr Henning Hopf (Germany)
Dr Jo Husbands (United States of America)
Professor Jorge Guillermo Ibañez Comejo (Mexico)
Mr Amirhossein Imani (Islamic Republic of Iran)
Dr Nancy Jackson (United States of America)
Dr Patrick John Lim (Philippines)
Professor Mohd Jamil Maah (Malaysia)
Dr Detlef Maennig (Germany)
Professor Peter Mahaffy (Canada)
Dr Robert Mathews (Australia)
Professor Temechehn Engida (Ethiopia)
Dr Kabrena Rodda (United States of America)
Dr Ting Kueh Soon (Malaysia)
Professor Alejandra Graciela Suarez (Argentina)
Professor Leiv K. Sydnæs (Norway)
Mr Cheng Tang (China)
Professor Natalia P. Tarasova (Russian Federation)
Dr Christopher Timperley (United Kingdom of Great Britain and Northern Ireland)
Dr Hans-Georg Weinig (Germany)
Dr Prashant Yajnik (India)
Dr Muhammad Zafar-Uz-Zaman (Pakistan)
Professor Zuriati Binti Zakaria (Malaysia)
Mr Muhammad Setyabudhi Zuber (Indonesia)



Bangladesh Chemical Society



中华人民共和国工业和信息化部
Ministry of Industry and Information Technology of the People's Republic of China





Culture of responsible chemistry



SAB Vice-Chair Cheng Tang attended two meetings on CBRN security culture at side-events of the Global Partnership against the Spread of WMD



**SIDE EVENT G7 GLOBAL PARTNERSHIP:
COMPREHENSIVE CBRN SECURITY CULTURE:
MOVING FORWARD TO ADDRESS NEW CHALLENGES**

**April 24, 2015
United States Consulate
Munich, Germany
Königinstraße 5**

Hosted by the U.S. Consulate in Munich under the auspices of Germany's Presidency of the G7 Global Partnership and in cooperation with the United Nations Office for Disarmament Affairs and the Global Partnership Sub-Working Group on Centers of Excellence and CBRN Security, using funds from the UN Trust Fund for Global and Regional Disarmament Activities donated by the Governments of Norway, the United States of America and the European Union



**“A Road Map for Comprehensive and Sustainable CBRN Security Culture”
Berlin, 3 November 2014**

**“Comprehensive CBRN Security Culture:
Moving Forward to Address New Challenges”
Munich, 24 April 2015**

OPCW recognised as an interface among States Parties and different stakeholders on chemical security culture



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Verification

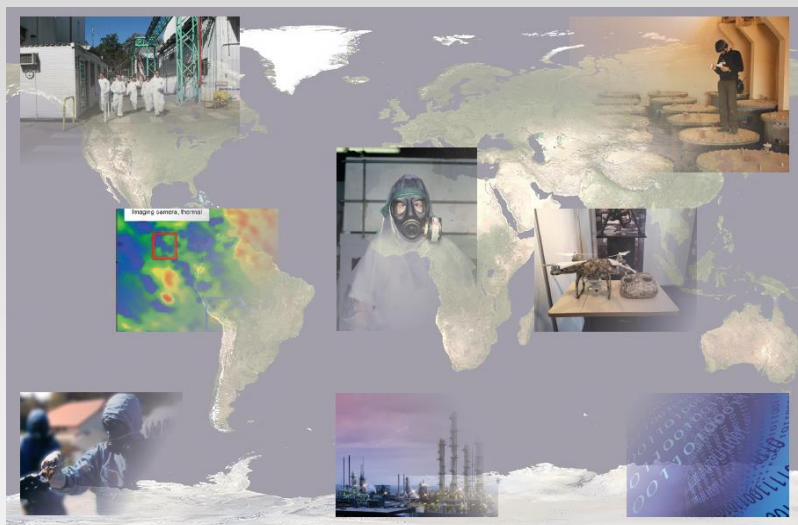


Verification TWG



15 experts with difference expertise; Chairperson Prof. Roberto Martinez-Alvarez

Experiences of international organisations and Secretariat were shared with TWG



VERIFICATION

REPORT OF THE SCIENTIFIC ADVISORY
BOARD'S TEMPORARY WORKING GROUP

June 2015



ORGANISATION FOR THE PROHIBITION
OF CHEMICAL WEAPONS

What are the technologies/methodologies used for verification purposes in other international treaties that could benefit the verification regime of the CWC?

Systematic use of information collected from multiple sources by the Secretariat could, e.g. assist States Parties identify declarable activities and the Secretariat to follow global trends relevant to verification

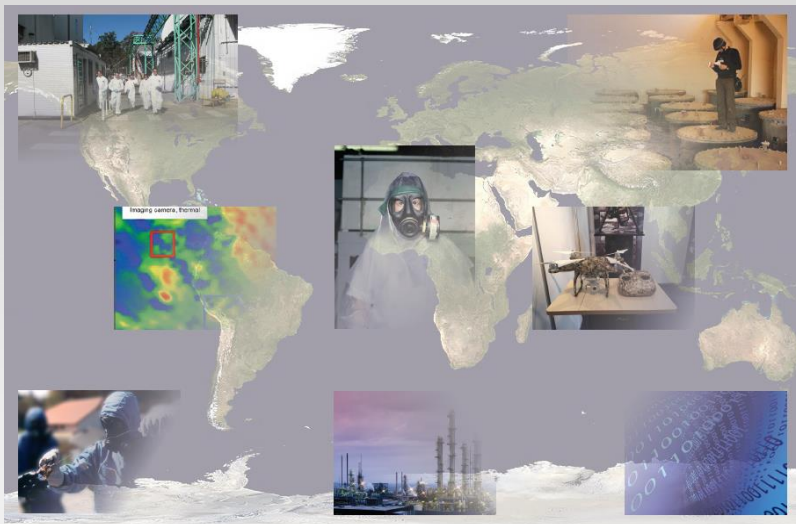
Recommendation

Secretariat should consider adopting a comprehensive more analytical approach to verification utilising all available and verifiable information



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VERIFICATION

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June 2015



ORGANISATION FOR THE PROHIBITION
OF CHEMICAL WEAPONS

Which methodologies (whether existing or new) could assist States Parties to ensure that all declarable plant sites are identified for declaration?

Effective use of open-source information could help the Secretariat identify and understand the wider development and trends of the chemical industry

This could help OPCW to be able to address future developments/evolving challenges

Recommendation

Secretariat should acquire the capability to use open-source information routinely



Which new or emerging technologies may add value to existing capabilities for verification purposes (such as data analysis/data mining, statistical analysis, attribution analysis)?

A more analytical approach to verification using all available information would require improved information management support within OPCW

Recommendations

Secretariat should put in place an information management structure that can provide the support required for the verification process

Remote/automated monitoring technologies should be added to the list of approved inspection equipment

Secretariat should look into the option of using satellite imagery for the planning of non-routine missions, in particular for investigations of alleged use (IAU) and challenge inspections



Which new or emerging technologies may add value to existing capabilities for verification purposes (such as data analysis/data mining, statistical analysis, attribution analysis)?

Recommendations

Secretariat should visit the National Authorities to obtain assurance on the accuracy and completeness of declarations; outcome of such visits may impact on the inspection frequency

Secretariat must commission an independent review of all activities pertaining to the missions carried out in the Syrian Arab Republic





What are the key technical components of a consistent approach to declaring complex mixtures of discrete organic chemicals (DOCs)?

Part IX of the Verification Annex puts the focus on the plant sites that produce DOCs, rather than on the chemicals.

CWC does not exempt facilities producing mixtures containing low concentrations of DOCs from declaration requirements, nor does it define a purity level for DOCs

Recommendation

List of declarable OPCFs submitted by States Parties should include all facilities that fall under the requirement of para. 1 of Part IX of Verification Annex, regardless of the purity level of a DOC or DOC mixtures produced



What are the verification aspects of the meaning of “produced by synthesis”?

Recommendations

Not all facilities that fall under Part IX of the Verification Annex should be considered of the same relevance to the object and purpose of the CWC

(TWG has recommended a practical approach for enhancing the utilisation of verification resources for OCPF declaration and on-site processes)

Verification thresholds for OCPFs producing highly relevant chemicals, and the possibility of revision of the product codes should be addressed by SAB as well as the industry cluster



How can sampling and analysis be utilised most effectively for verification purposes?

Recommendations

OPCW should increase staff of OPCW Laboratory to cope with:

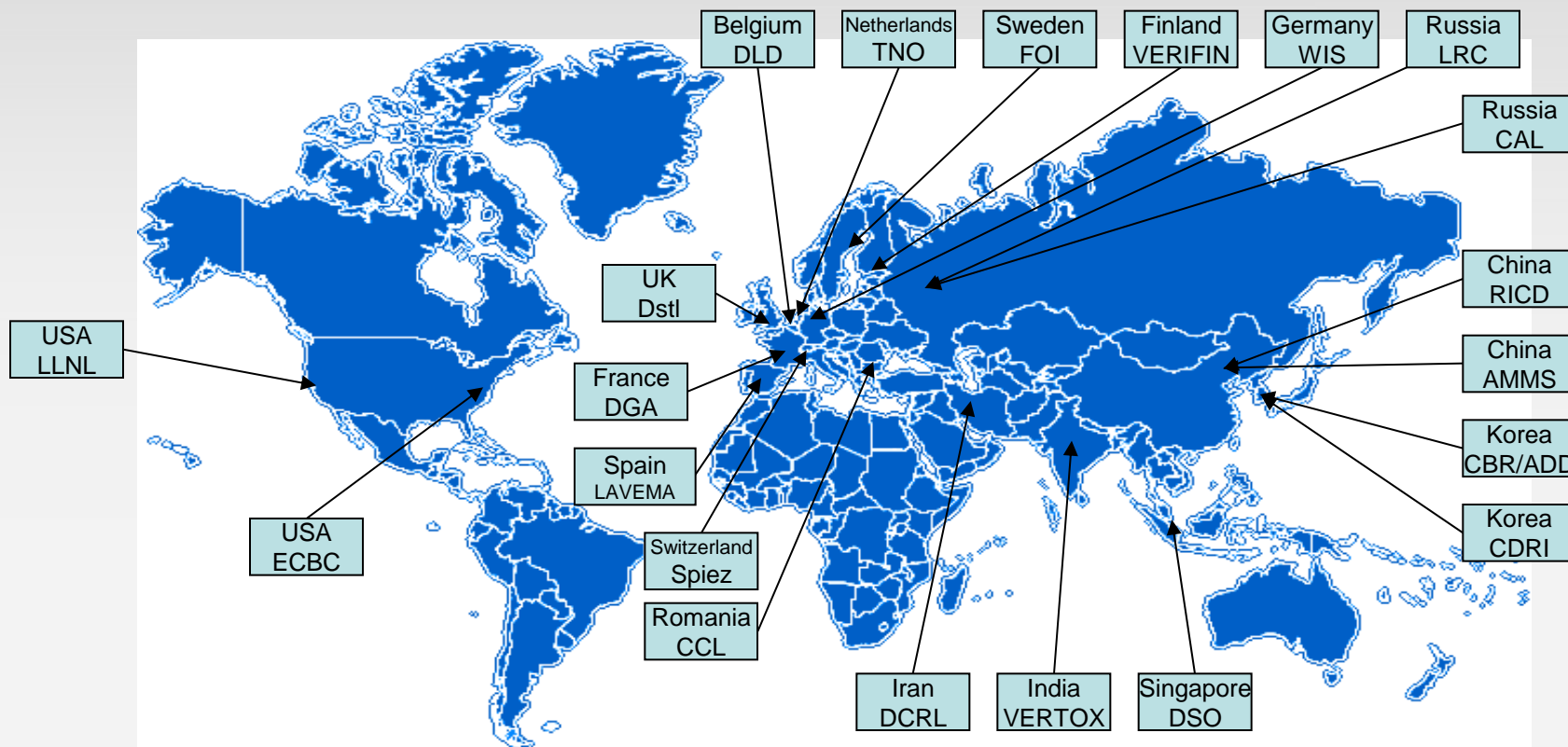
- various aspects of IAU
- biomedical samples
- trace environmental analysis
- toxins
- on-site analysis

Establishing a network of Designated Labs for biomedical sample analysis should be a high priority





OPCW Designated Laboratories (environmental)



21 Designated Laboratories (7 suspended) in 17 countries

as of March 2015



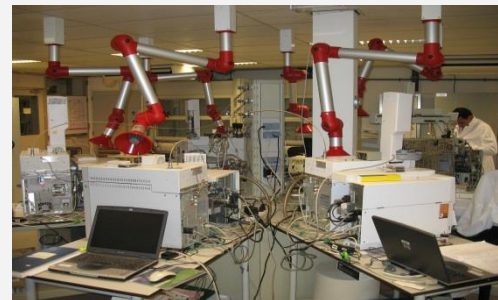
How can sampling and analysis be utilised most effectively for verification purposes?

Recommendations

Lessons on chemical sampling and analysis form the OPCW's support to the UN Mission to investigate the use of CW in the Syrian Arab Republic, and all subsequent OPCW activities in relation to the Syrian Arab Republic must be identified and implemented



Proficiency Tests should incorporate a broader range of chemicals and at a wider range of concentrations to prepare laboratories for IAU scenarios





How can sampling and analysis be utilised most effectively for verification purposes?

Recommendations

Secretariat should expedite toxin identification exercises

Continuous additions to OCAD are recommended to allow the OPCW to meet all its mandated inspection aims, including IAU

Developments in analytical instrument portability, miniaturisation and disposable biosensors should be reviewed periodically by the Secretariat and SAB for potential applicability for on-site analysis

Secretariat should monitor developments in attribution analysis/chemical forensics



Which methodologies might be helpful for the Secretariat to keep abreast of developments in science and technology of relevance to the CWC verification regime?

Recommendation

Secretariat should augment its capability to monitor and forecast developments in science and technology of relevance to the Convention and its verification regime

Follow-up to the Verification Report

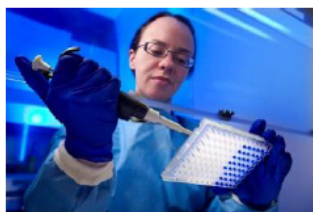
SAB Chairperson briefed industry cluster on recommendations 4, 9, 10 and 15 on 6 Oct 2015 following note from Director-General (EC-80/DG.7)



Verification report to BWC

DEVELOPMENTS IN SCIENCE & TECHNOLOGY RELEVANT TO THE BWC

BWC Meeting of Experts Side Event
Monday 10 August 2015 at 13:00
E Building, Palais des Nations, Geneva



OPENING REMARKS – Swiss Government

OPEN SOURCE TOOLS FOR CONFIDENCE IN COMPLIANCE

Gunner Jeremias, University of Hamburg

REPORT OF THE OPCW TEMPORARY WORKING GROUP ON VERIFICATION TECHNOLOGY

Christopher Timperley, Chair of the OPCW Scientific Advisory Board

ADVANCES IN BIO-BASED PRODUCTION - HIGHLIGHTS FROM AN IAP WORKSHOP

Katherine Bowman [or TBD], U.S. National Academies of Sciences,
Engineering, and Medicine

ASSESSMENT OF CURRENT S&T REVIEW PROCESS

Piers Millet, Biosecure Ltd.

**Verification report presented also to BWC MX plenary on 12 Aug
2015 under ‘review of developments in S&T related to the BWC’**



ORGANISATION FOR THE
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Working together for a world free of chemical weapons

Science and technology



Invited speakers at SAB-22



Prof. Ake Sellstrom

Leader of the UN mission to investigate the use of chemical weapons in the Syrian Arab Republic



Dr. Daan Noort

Principal scientist at the Netherlands Organisation for Applied Scientific Research (TNO) Defence, Safety and Security



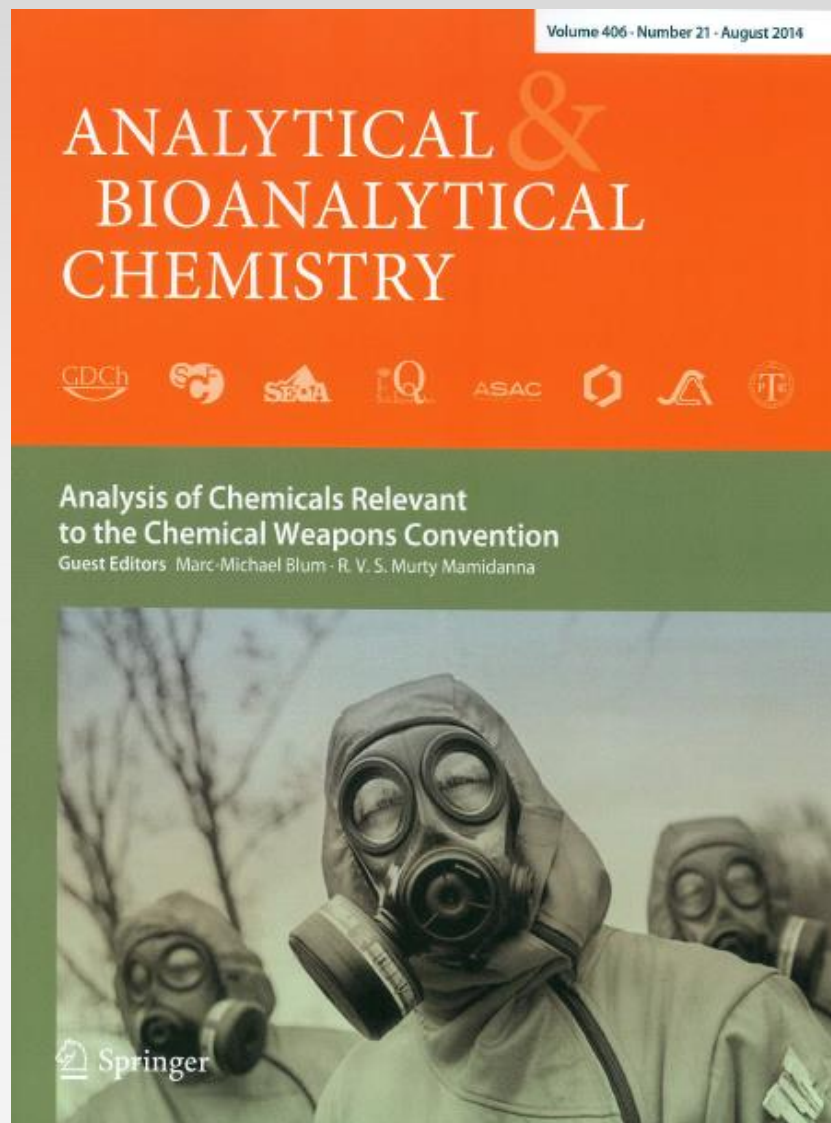
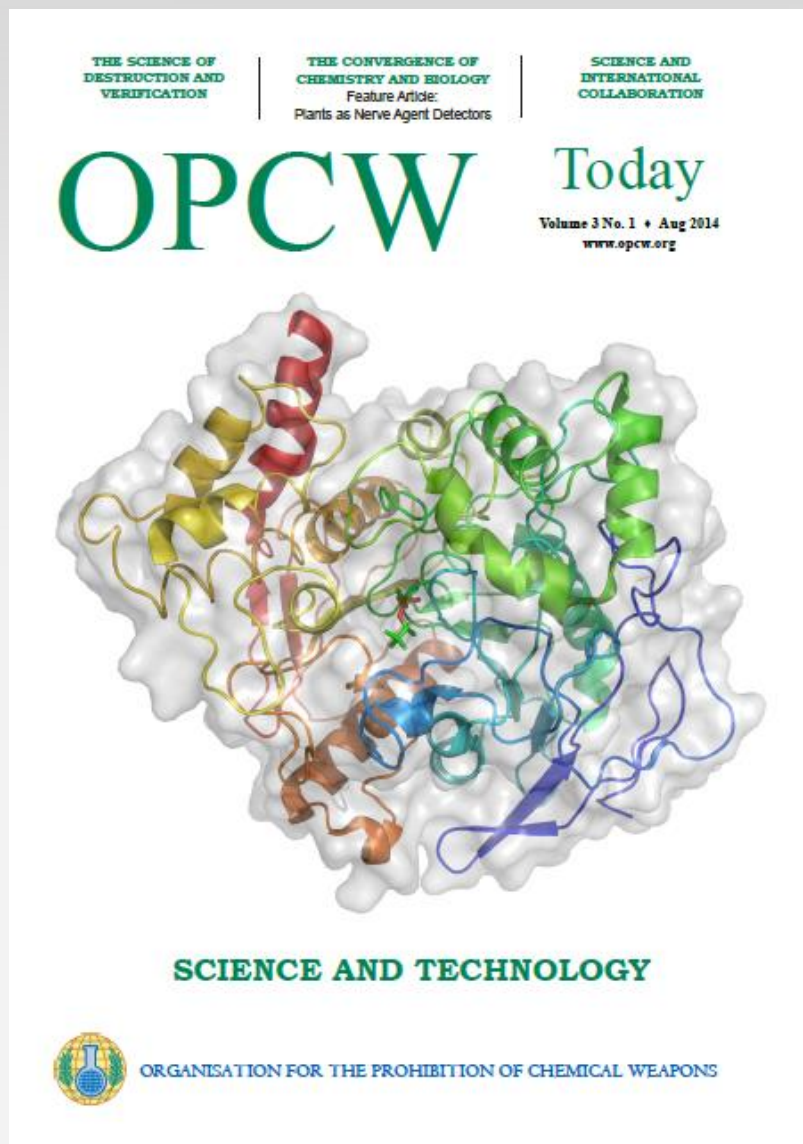
Ambassador Istvan Gyarmati

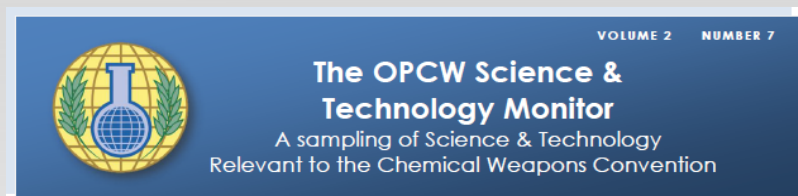
Chairperson of the Advisory Board to the UN Secretary-General on Disarmament Matters



ORGANISATION FOR THE
PROHIBITION OF CHEMICAL WEAPONS

Working together for a world free of chemical weapons





1 June 2015

In This Issue

Medical Countermeasures

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Featured content

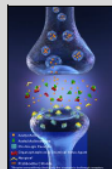


Image from [DuoDate®](#)
Medical countermeasures at
work in a synapse.



Fingerprinting chemicals.

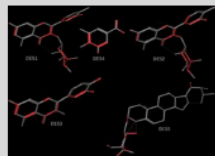


Image from [Plos One, 2013 Nov, 8\(11\)](#)
Drug discovery research in
OPCW Supported Research
Projects

Welcome

Welcome to the OPCW *Science and Technology Monitor*, an occasional bulletin to provide updates on developments in science and technology across a broad spectrum of topics relevant to the CWC. Past issues are available from the [Science and Technology section of the OPCW website](#).

Thanks to all of you who have taken our survey. For those who have not yet responded, the survey is still open ([click here](#)). There are only six questions, all easier than the puzzle (we promise) and all responses are anonymous. Your feedback is highly appreciated!

Today marks the 25th anniversary of the [signing of the 1990 Chemical Weapons Accord by the United States of America and the Soviet Union](#). This agreement, which pre-dated the CWC, marks one of many steps taken in the journey toward a world free of chemical weapons. Steps taken in chemical disarmament have been supported by the science of chemistry itself; a scientific field that provides opportunities for international collaborations and brings forth new developments with peaceful economic and technological benefits. [As we move into the future, we look forward to a wealth of new discoveries from this evolving scientific field.](#)

The S&T Puzzle

We once again congratulate our colleagues at the [CTBTO](#), whose entry correctly recognized four of the top five spoken words of the Director-General in the eight statements delivered [from 22 January to 29 April 2015](#) (in case you were wondering, they missed "States"). The prize for best visualisation of the words of the Director-General, however, goes unclaimed as no submissions (except our own, below) were received. Puzzle statistics now stand at: VER 4, OSP 2, OCS 1, INS 1 and CTBTO 3.



For this edition of the puzzle, we look at the multiple uses of a cup of coffee. Can you tell us the identity and LD₅₀ (that's right, the median lethal dose) of the most abundant chemical in the cup; the [molarity \(M\)](#) of caffeine (molecule above); and the LD₅₀ of coffee itself? To keep this simple, assume this coffee is made with [Arabica beans](#) and brewed by a certified procedure (for



Monitoring latest S&T

Monthly newsletter in popular science
format on topics relevant to the CWC

Chemical Forensics

We thank our colleagues from the OPCW Laboratory for their major contribution and input to this feature

The ability to obtain unique signatures such as [fingerprints](#) and [DNA](#) to identify individuals or the [marks left on a fired bullet to identify the firearm that shot it](#), to compare with reference materials (such as a fingerprint obtained from a suspect) are among the most powerful forensic tools available to law enforcement. Chemical signatures that indicate [drug use](#) or [gender](#) can even be collected from fingerprints.

Chemical samples can also have unique signatures that might reflect how and where they originated. For the Chemical Weapons Convention, one might ask, questions such as: What kind of molecular signatures exists for chemical warfare agents and toxic chemicals that may have been used in an incident under investigation, what kind of reference samples are required for comparison and [what kind of forensic information can be obtained with such information?](#)



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SCIENCE FOR DIPLOMATS

THE SCIENCE OF MEDICAL COUNTERMEASURES

Wednesday 8 July 2015

13:30 - 15:00

Ooms Room

Light lunch will be available at 13:00



ORGANISATION FOR THE PROHIBITION
OF CHEMICAL WEAPONS





Assistance and protection

SAB has provided further advice on nerve agent medical countermeasures



OPCW

Scientific Advisory Board

Twenty-Second Session
8 – 12 June 2015

SAB-22/WP.2/Rev.1
10 June 2015
ENGLISH only

**RESPONSE TO THE DIRECTOR-GENERAL'S REQUEST TO THE
SCIENTIFIC ADVISORY BOARD TO PROVIDE FURTHER ADVICE ON
ASSISTANCE AND PROTECTION**



Planning for SAB report for RC-4

Two SAB meetings scheduled in 2016 and two in 2017

Plan to issue the SAB report 9 months prior to RC-4, so that :

- States Parties will be able to take scientific advice into account when formulating national positions
- States Parties will be able to discuss S&T developments in preparation for the review conference
- Technical Secretariat will be able to take S&T advice into account when making substantive proposals to the Review Conference

SAB highlighted the value of the Secretariat's S&T monitoring efforts



Intersessional work

Workshops on S&T topics will be organised by the Technical Secretariat to facilitate deliberations for SAB's report to RC-4

- **Chemical forensics (CW agents and their precursors)**
- **Mechanisms of toxicity of chemical warfare agents**

SAB members will attend scientific conferences to ensure the highest quality of S&T advice feeds into the SAB report to RC-4

SAB will provide technical advice in response to the Director-General's requests, on isotopically-labelled scheduled chemicals, and on stereoisomers of scheduled chemicals by middle of 2016



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SAB-22



Questions?