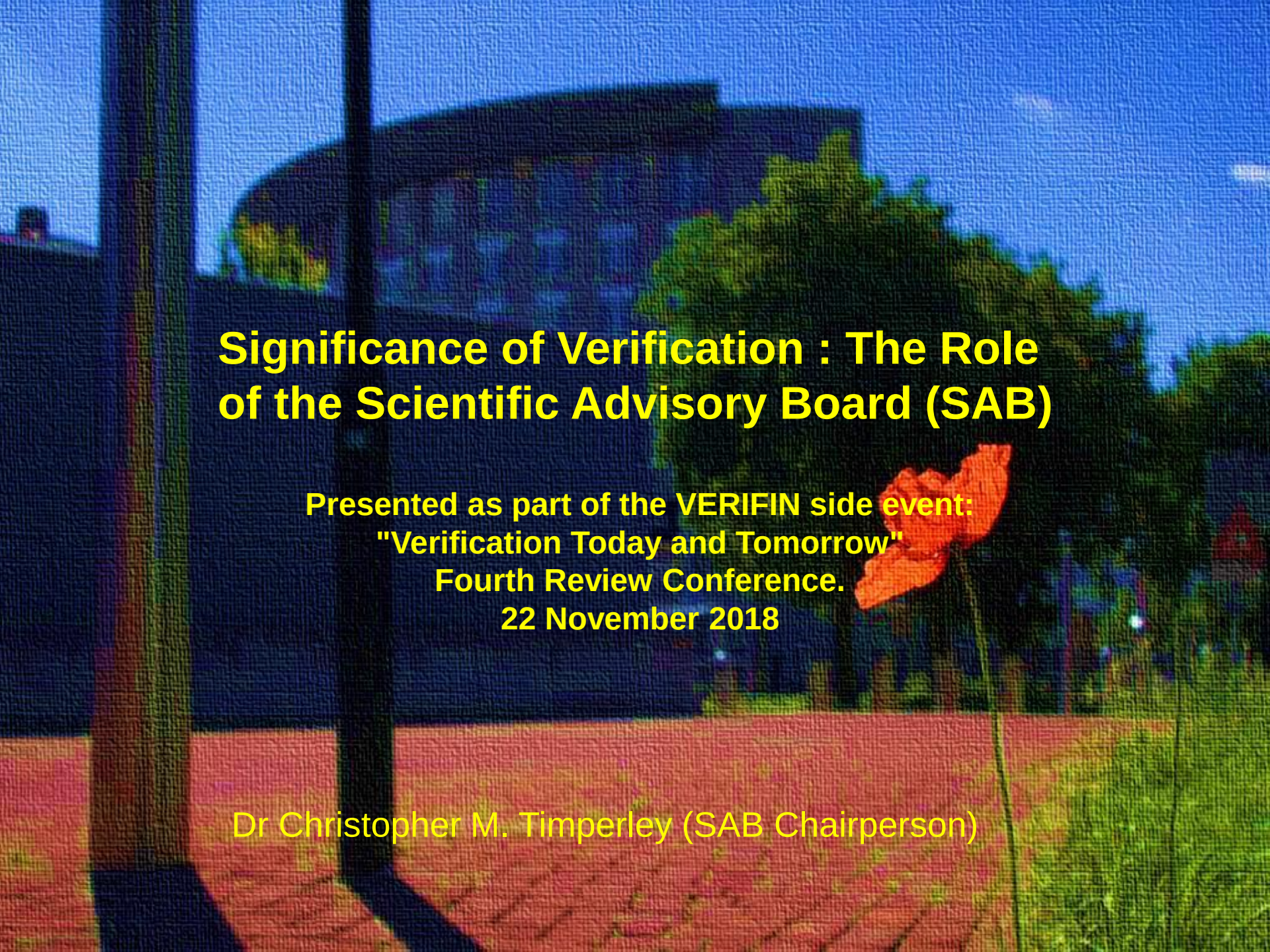
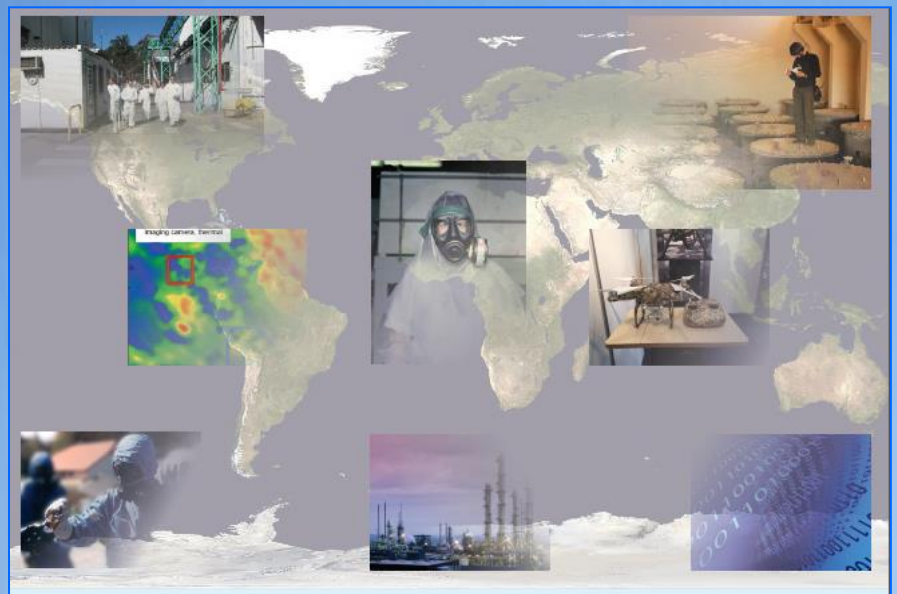


Significance of Verification : The Role of the Scientific Advisory Board (SAB)

Presented as part of the VERIFIN side event:
"Verification Today and Tomorrow"
Fourth Review Conference.
22 November 2018

Dr Christopher M. Timperley (SAB Chairperson)

Importance of Verification



VERIFICATION

REPORT OF THE SCIENTIFIC ADVISORY BOARD'S TEMPORARY WORKING GROUP

June 2015

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

CONVERGENCE OF CHEMISTRY AND BIOLOGY

REPORT OF THE SCIENTIFIC ADVISORY BOARD'S TEMPORARY WORKING GROUP

JUNE 2014

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Annex on Chemicals

Schedule 1

Guidelines for Schedule 1

The following criteria shall be taken into account in considering whether a toxic chemical or precursor should be included in Schedule 1:

(a) It has been developed, produced, stockpiled or used as a chemical weapon as defined in Article II;

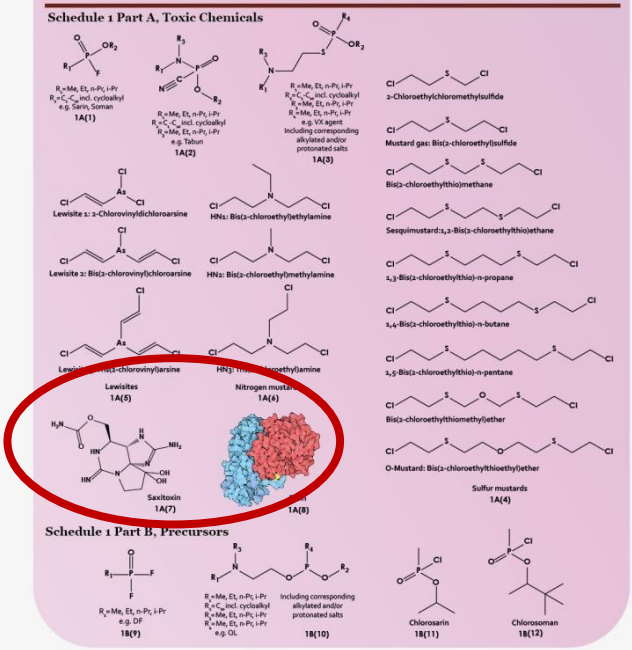
(b) It poses otherwise a high risk to the object and purpose of this Convention by virtue of its high potential for use in activities prohibited under this Convention because one or more of the following conditions are met:

(i) It possesses a chemical structure closely related to that of other toxic chemicals listed in Schedule 1, and has, or can be expected to have, comparableproperties;

(ii) It possesses such lethal or incapacitating toxicity as well as other properties that would enable it to be used as a chemical weapon;

(iii) It may be used as a precursor in the final single technological stage of production of a toxic chemical listed in Schedule 1, regardless of whether this stage takes place in facilities, in munitions or elsewhere;

(c) It has little or no use for purposes not prohibited under this Convention.



Schedule 2

Guidelines for Schedule 2

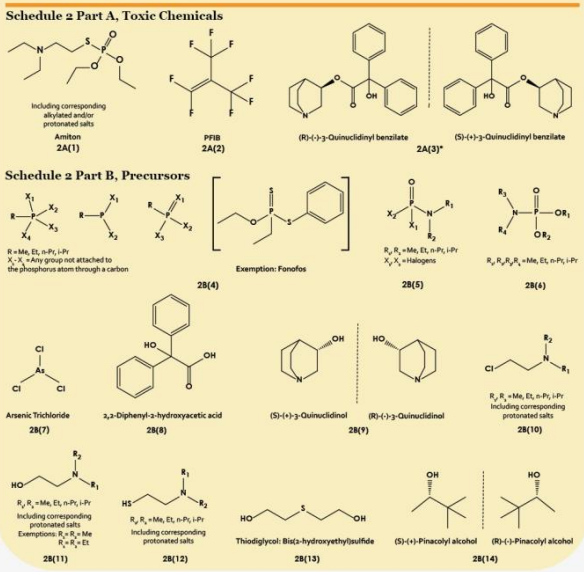
The following criteria shall be taken into account in considering whether a toxic chemical not listed in Schedule 1 or a precursor to a Schedule 1 chemical or to a chemical listed in Schedule 2, part A, should be included in Schedule 2:

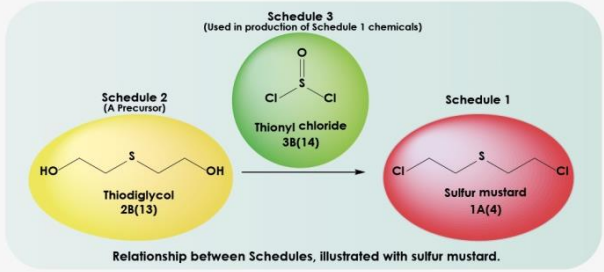
(a) It poses a significant risk to the object and purpose of this Convention because it possesses such lethal or incapacitating toxicity as well as other properties that could enable it to be used as a chemical weapon;

(b) It may be used as a precursor in one of the chemical reactions at the final stage of formation of a chemical listed in Schedule 1 or Schedule 2, part A;

(c) It poses a significant risk to the object and purpose of this Convention by virtue of its importance in the production of a chemical listed in Schedule 1 or Schedule 2, part A;

(d) It is not produced in large commercial quantities for purposes not prohibited under this Convention.





Schedule 3

Guidelines for Schedule 3

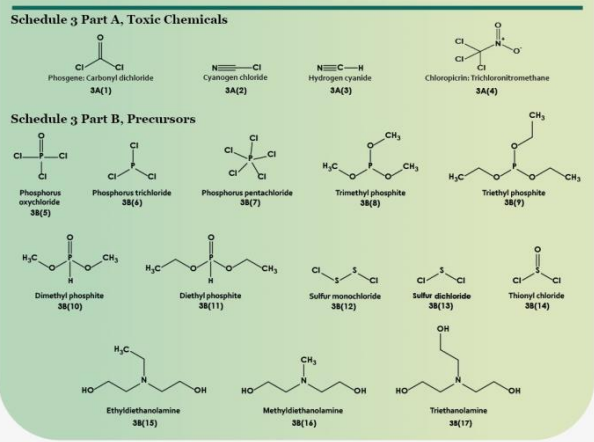
The following criteria shall be taken into account in considering whether a toxic chemical or precursor, not listed in other Schedules, should be included in Schedule 3:

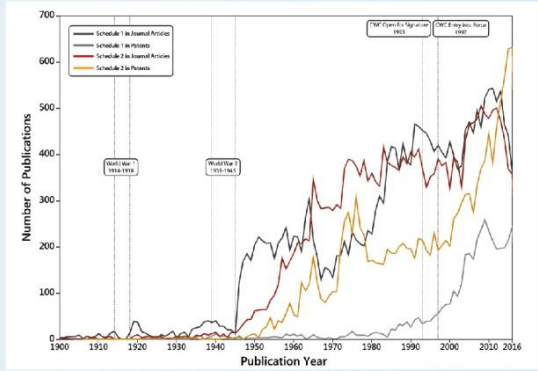
(a) It has been produced, stockpiled or used as a chemical weapon;

(b) It poses otherwise a risk to the object and purpose of this Convention because it possesses such lethal or incapacitating toxicity as well as other properties that might enable it to be used as a chemical weapon;

(c) It poses a risk to the object and purpose of this Convention by virtue of its importance in the production of one or more chemicals listed in Schedule 1 or Schedule 2, part B;

(d) It may be produced in large commercial quantities for purposes not prohibited under this Convention.





Scheduled chemicals, including those in schedules 1 and 2, can have scientifically and economically important uses. This chart captures the number of yearly scientific publications that refer to them.

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Working Together for a World Free of Chemical Weapons

@opcw @opcw_st /opcwonline /opcwonline /company/opcw /opcw

Designated Laboratory network

- Analytical chemistry is a key tool for verification under the Convention
- Significance of international cooperation (Blue Book) for verification analysis and its development has never been more important because of the repetitive contravention of the Convention during the last 5 years

Chemical Forensics Workshop

OPCW — **Scientific Advisory Board**

Twenty-Fourth Session
25 – 28 October 2016

SAB-24/WP.1
14 July 2016
ENGLISH only

REPORT OF THE SCIENTIFIC ADVISORY BOARD'S WORKSHOP ON CHEMICAL FORENSICS

1. EXECUTIVE SUMMARY

1.1 The OPCW Scientific Advisory Board (SAB) in cooperation with VERIFIN held a workshop,[1] "Chemical Forensics: Capabilities across the Field and the Potential Applications in Chemical Weapons Convention Implementation", from 20 to 22 June 2016 in Helsinki, Finland. The workshop is one of a series intended to inform the report of the SAB on developments in science and technology to the Fourth Review Conference[2] of the Chemical Weapons Convention to be held in 2018. Interest in chemical forensics, and its relevance to the work of the OPCW, has been described through Recommendation 17 of the OPCW SAB's Temporary Working group on Verification.[3]

1.2 Forensic science is defined as the study of traces (remnants of presence and/or activity).[4, 5] These are silent witnesses that need to be detected, seen, and understood to make reasonable inferences about criminal phenomena, investigation or demonstration for intelligence, investigation and court purposes.

1.3 Chemical forensics aims to obtain information from chemical remnants that is relevant to investigative, legal and intelligence questions. Just as fingerprints and DNA can provide unique signatures that can be used to identify individuals, chemical samples can provide distinctive signatures (for example through their impurities

1 Funding for the workshop was provided in part through project III (Science and Technology: Assessment of Developments in Science and Technology) of EU Council Decision (CFSP) 2015/259 dated 17 February 2015. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.043.01.0014.01.ENG

2 Fourth Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention.

3 Verification, Report of the Scientific Advisory Board's Temporary Working Group (SAB/REP/1/15, dated June 2015). Available at www.opcw.org/fileadmin/OPCW/SAB/en/Final_Report_of_SAB_TWG_on_Verification_-_as_presented_to_SAB.pdf

Recommendations to Fourth Review Conference

Toxins (ricin, saxitoxin and others)

OPCW should enhance its efforts to strengthen the capabilities of international laboratories to identify the hostile use of toxins and analyse samples for toxins, through enhanced scientific collaboration

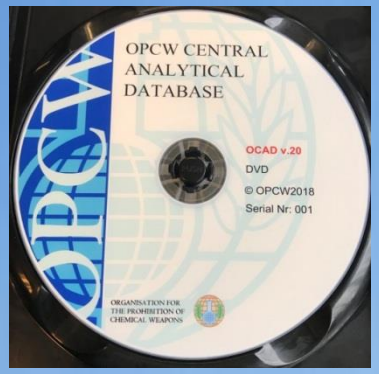
Central nervous system acting chemicals

OPCW should be prepared to conduct missions involving their alleged use for hostile purposes, including sample collection and the addition of analytical data to the OPCW Central Analytical Database

Toxic industrial chemicals (e.g. chlorine)

OPCW should seek to identify markers that may be formed through reactions of such chemicals with living tissue or materials present in the environment and assess the utility of these markers in investigations

Recommendations to Fourth Review Conference



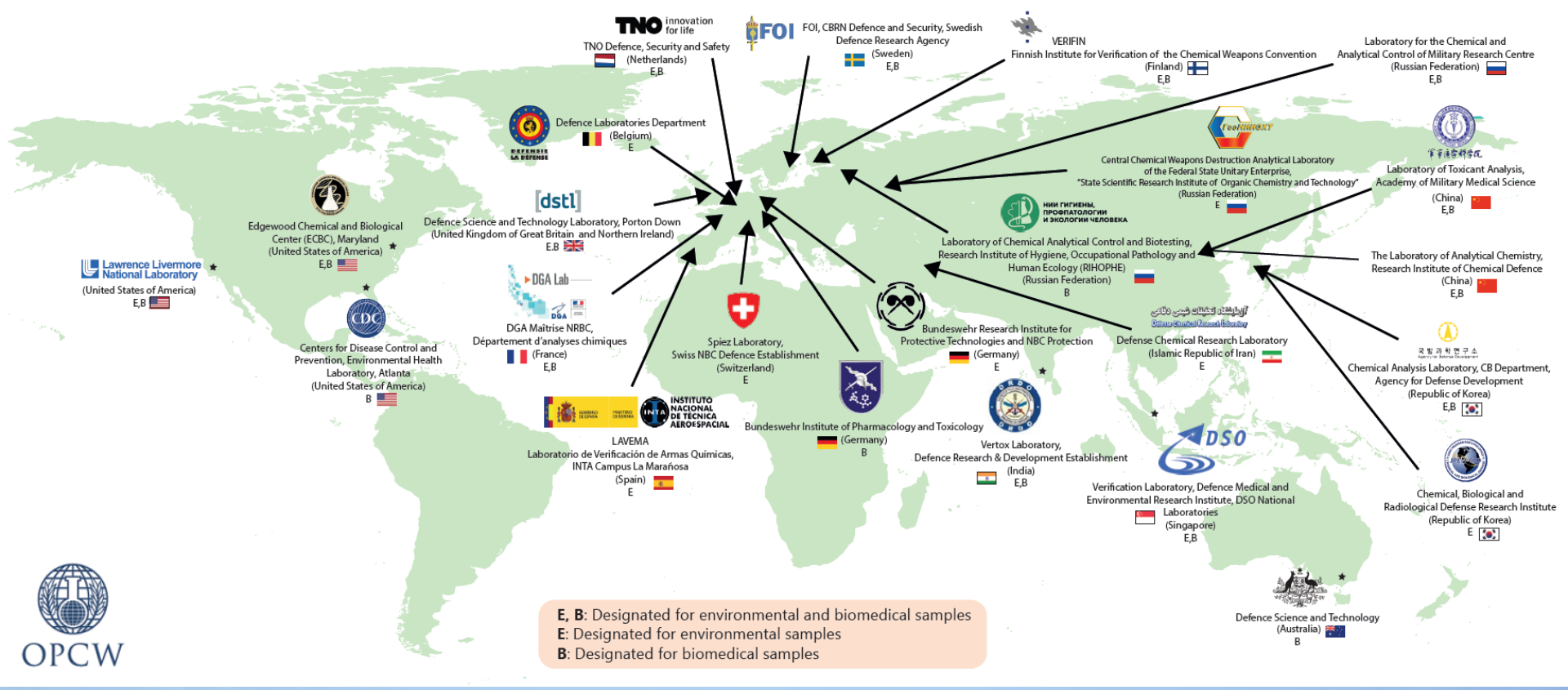
Additions to OPCW Central Analytical Database (OCAD)

Analytical data for chemicals that may pose a risk to the Convention or that are needed to help differentiate permitted activities from prohibited activities should be added to the OCAD

Such additions could include :

- Isotopically-labelled scheduled chemicals
- Stereoisomers of scheduled chemicals
- Salts of scheduled chemicals
- Central nervous system acting chemicals
- Toxic industrial chemicals
- Riot control agents
- Bioregulators and toxins
- Unscheduled chemicals posing a risk to the Convention

Recommendations regarding the laboratory network



- To strengthen capability of the network to analyse operational samples, preparedness to do so should be a factor in maintaining designation
- The network should be expanded geographically and in its capabilities

Temporary Working Group on Investigative Science

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

Working Together For a World Free of Chemical Weapons

Temporary Working Group on Investigative Science and Technology

Reporting to the Scientific Advisory Board (SAB), the Temporary Working Group (TWG) will in particular consider the following questions:

Question 1:
Which methods and capabilities used in the forensic sciences could usefully be developed and/or adopted for Chemical Weapons Convention-based investigations?

Question 2:
What are the best practices and analysis tools used in the forensic sciences for effectively cross-referencing, validating, and linking together information related to investigation sites, materials collected/analysed, and individuals interviewed?

Question 3:
What are the best practices for management of data collected in investigations, including compilation, curation, and analytics?

Question 4:
What are the best practices for the collection, handling, curation and storage, and annotation of evidence?

Question 5:
Which technologies and methodologies (whether established or new) allow point-of-care and non-destructive measurements at an investigation site to help guide evidence collection?

Question 6:
Which technologies and methodologies (whether established or new) can be used in the provenancing of chemical and/or material samples collected in an investigation?

Question 7:
Which methods are available (or are being developed) for the sampling and analysis of environmental and biomedical materials and can be used in the detection of toxic industrial chemicals relevant to the Chemical Weapons Convention?

Question 8:
Which technologies and methodologies (whether established or new) can be used in ensuring chain of custody and verifying authenticity (especially in regard to digital images and video recordings)?

Question 9:
Which technologies and methodologies (whether established or new) can be used to ensure the integrity of an investigation site?

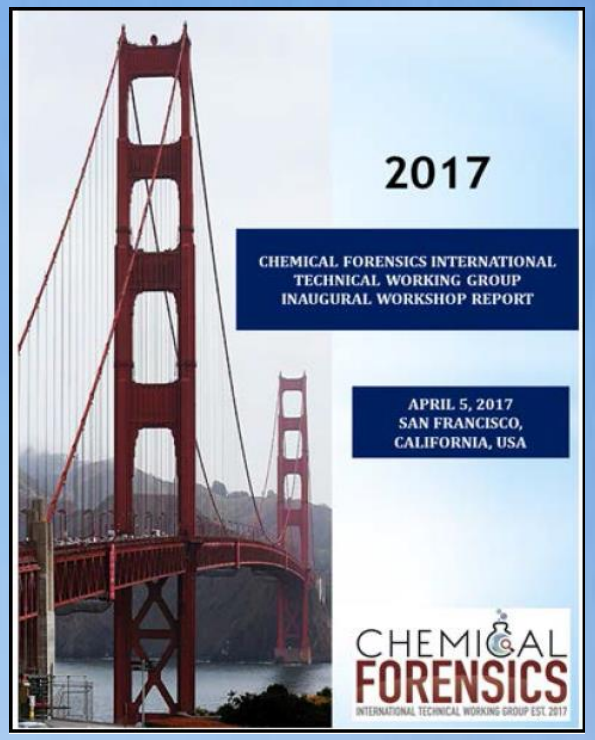
Question 10:
Do collections of physical objects, samples, and other information for chemical weapons-related analysis exist and can they be made available to investigators for retrospective review? How might these collections be used to support investigations?

Question 11:
Are there stakeholders that the Technical Secretariat could usefully engage with to leverage their capabilities on investigative matters?

In addition, the TWG will provide advice on Technical Secretariat proposals for methodologies, procedures, technologies, and equipment for investigative purposes.

Chemical Forensics International Technical Working Group

Established to address gaps in chemical forensics science and capabilities through international partnership



1st CFITWG Meeting 2017

49 participants, 27 organizations

7 countries :

Australia, Finland, Netherlands, Serbia, Sweden, UK, USA

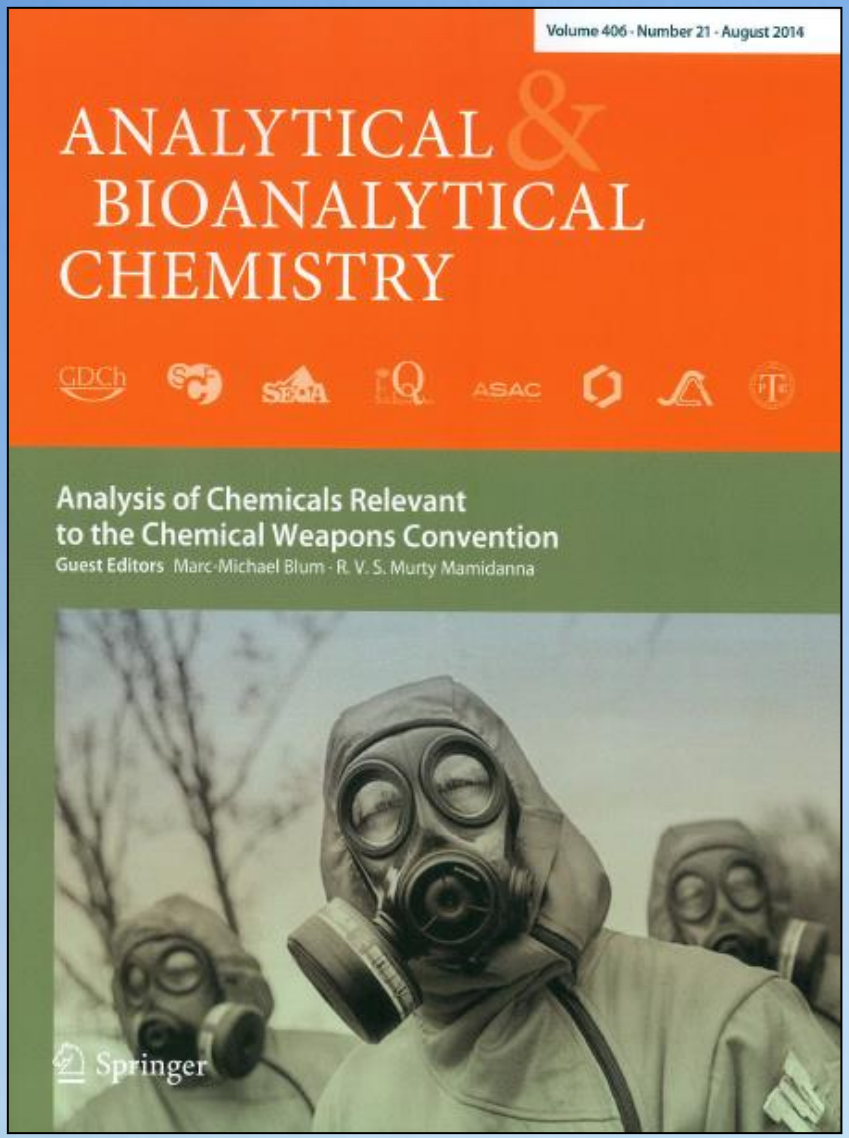
2nd CFITWG Meeting 2018

40 participants

12 countries :

Australia, Finland, France, Germany, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK, USA

Data sharing and scientific publications



Talanta 188 (2018) 808–832

Contents lists available at ScienceDirect

Talanta

journal homepage: www.elsevier.com/locate/talanta

Advice on chemical weapons sample stability and storage provided by the Scientific Advisory Board of the Organisation for the Prohibition of Chemical Weapons to increase investigative capabilities worldwide

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Recent publications relevant to sampling and analysis

DE GRUYTER Pure Appl. Chem. 2018; aop

Conference paper

Christopher M. Timperley*, Jonathan E. Forman*, Mohammad Abdollahi, Abdullah Saeed Al-Amri, Isel Pascual Alonso, Augustin Baulig, Veronica Borrett, Flerida A. Cariño, Christophe Curty, David Gonzalez, Zrinka Kovarik, Roberto Martínez-Álvarez, Robert Mikulak, Nicia Maria Fusaro Mourão, Ponnadurai Ramasami, Slawomir Neffe, Syed K. Raza, Valentin Rubaylo, Koji Takeuchi, Cheng Tang, Ferruccio Trifirò, Francois Mauritz van Straten, Paula S. Vanninen, Volodymyr Zaitsev, Farhat Waqar, Mongia Saïd Zina, Stian Holen and Hope A. Weinstein

Advice from the Scientific Advisory Board of the Organisation for the Prohibition of Chemical Weapons on isotopically labelled chemicals and stereoisomers in relation to the Chemical Weapons Convention

https://doi.org/10.1515/pac-2018-0803

Article note: A special issue containing invited papers on Innovative Technologies for Chemical Security, based on work done within the framework of the Chemical Weapons Convention.

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DE GRUYTER Pure Appl. Chem. 2018; 90(10): 1527–1557

Conference paper

Jonathan E. Forman*, Christopher M. Timperley*, Pål Aas, Mohammad Abdollahi, Isel Pascual Alonso, Augustin Baulig, Renate Becker-Arnold, Veronica Borrett, Flerida A. Cariño, Christophe Curty, David Gonzalez, Zrinka Kovarik, Roberto Martínez-Álvarez, Robert Mikulak, Evandro de Souza Nogueria, Ponnadurai Ramasami, Syed K. Raza, Ahmed E. M. Saeed, Koji Takeuchi, Cheng Tang, Ferruccio Trifirò, Francois Mauritz van Straten, Farhat Waqar, Volodymyr Zaitsev, Mongia Saïd Zina, Katarína Grolmusová, Guy Valente, Marlene Payva, Siqing Sun, Amy Yang and Darcy van Eerten

Innovative technologies for chemical security

https://doi.org/10.1515/pac-2018-0908

Article note: A special issue containing invited papers on Innovative Technologies for Chemical Security, based on work done within the framework of the Chemical Weapons Convention.
Article note: The views expressed herein are those of the authors and do not necessarily reflect those of OPCW, DSTL or the British Ministry of Defence, or any institutions affiliated with the other co-authors.

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Verification today and tomorrow

Today the Blue Book comprises a sustainable contribution to chemical disarmament by collating and disseminating analytical techniques and methods and compiling validated Recommended Operating Procedures

Tomorrow, through the support of the OPCW and international laboratories worldwide, and as sampling and analysis and investigative science evolve, it will continue to play a leading role in verification


What next?