Science for Diplomats

Biomedical Sample Analysis

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Jonathan E. Forman, Ph.D.
Science Policy Adviser
Office of Strategy and Policy

Marc-Michael Blum, Ph.D.
Senior Analytical Chemist
Organisation for the Prohibition of Chemical Weapons

SAB Report of the Developments in S&T to The Third review Conference

(RC-3/DG.1, Dated 29 October 2012)

Director General's Recommendations

(RC-3/DG.2, Dated 31 January 2013)

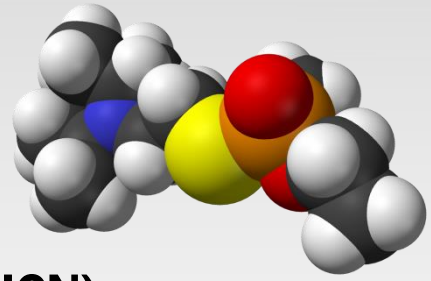
Status of the Follow-Up to the Recommendations on S&T to the Third Review Conference

(EC-77/DG.11, Dated 5 September 2014)

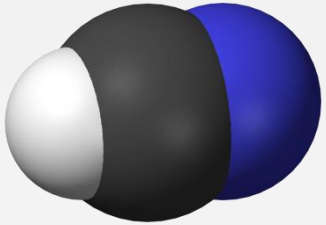
Laboratory Capabilities and Analysis	
"The Secretariat will continue to monitor developments relating to **unscheduled and novel toxic chemicals** and will explore ways in which to augment its **technical capabilities** in this area." "…notes the SAB's views on the **OPCW Central Analytical Database** and…the Secretariat needs to have analytical data on relevant unscheduled chemicals." (paragraphs 9 and 32 of RC-3/DG.2]	• The OPCW Laboratory (LAB) is monitoring developments, has noted the SAB's advice on RCAs, and is working with the Validation Group to obtain analytical data on relevant unscheduled chemicals • LAB is establishing a training laboratory • LAB participates in various activities and programmes (e.g. EQuATox). • OCAD continues to be regularly updated, it currently contains validated data for > 5000 scheduled chemicals
"..note the importance of continuing to **improve on-site and off-site analysis**" "…future such exercises will progress towards the more difficult analysis of longer-lived biomarkers of exposure, such as protein adducts" (paragraphs 24 and 25 of RC-3/DG.2)	• Effective capability was demonstrated in the investigation of alleged use in 2013. • LAB and OPCW Designated Laboratories are continually working on refining methodologies. • Workshops are routinely held with the Designated Laboratories and for review of proficiency testing • LAB is continuing to improve its capabilities for conducting biomedical sampling and analysis. • Chemical analysis was the topic for the first workshop (on 9 July) of the "Science for diplomats" series
"…a **review of the proficiency-testing programme** be undertaken" "…resources be made available to enable **regular exercises of the entire off-site analysis process** to be conducted in conjunction with OPCW field exercises." (paragraphs 26 and 30 of RC-3/DG.2)	• In July 2014, LAB held discussions with Designated Laboratories. • Dr. Robin Black, former SAB member, is chairing a group to review the proficiency testing programme • TS intends to seek funding through the annual programme and budget; not yet done due to the financial situation.

Scheduled Chemicals Span a Broad Range of Properties

VX (*O*-ethyl-*S*-[2(diisopropylamino)ethyl] methylphosphonothiolate



Hydrogen Cyanide (HCN)



Ricin

Chemistry Underpins Biology

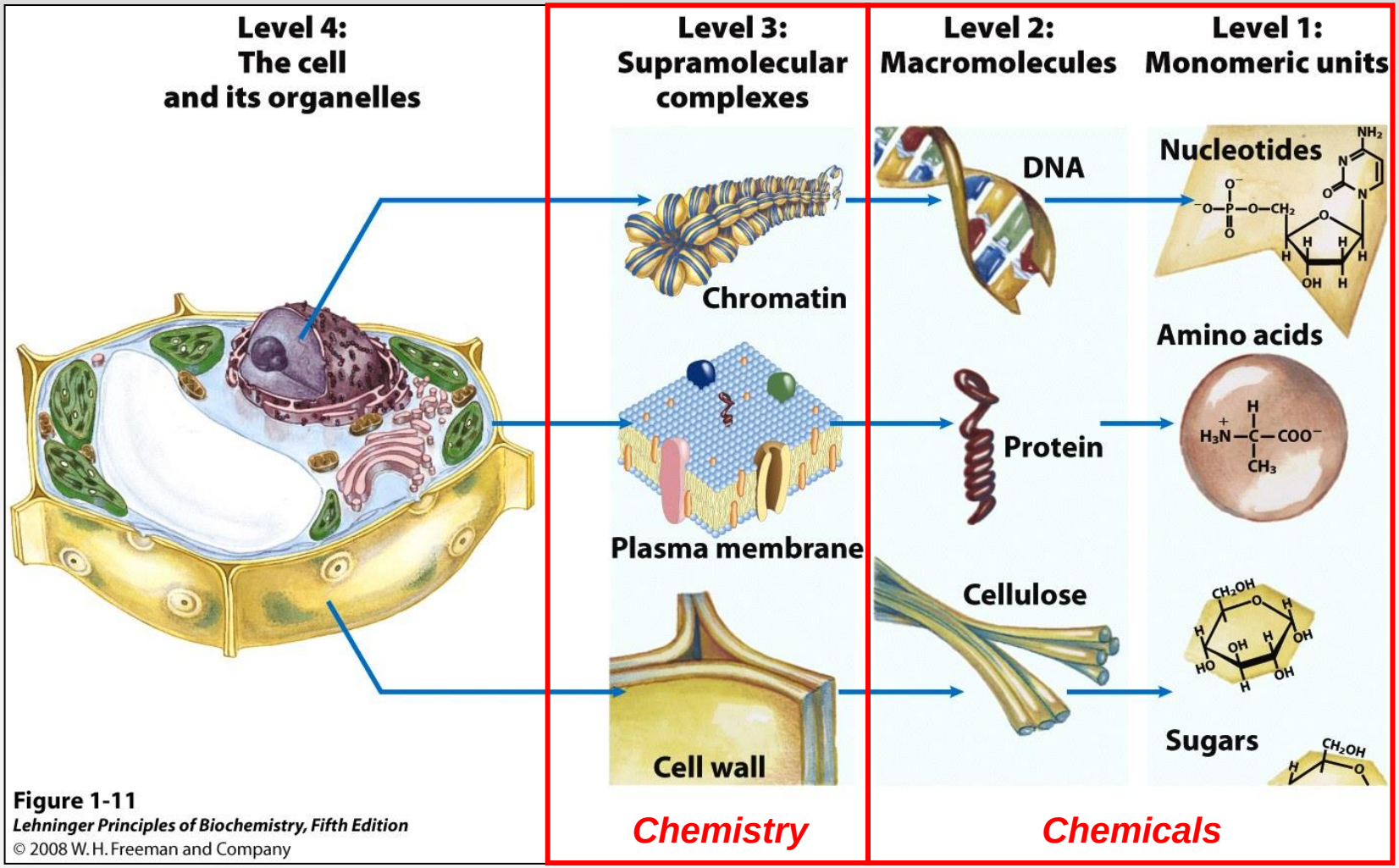


Figure 1-11
Lehninger Principles of Biochemistry, Fifth Edition

Biomedical Sample Analysis

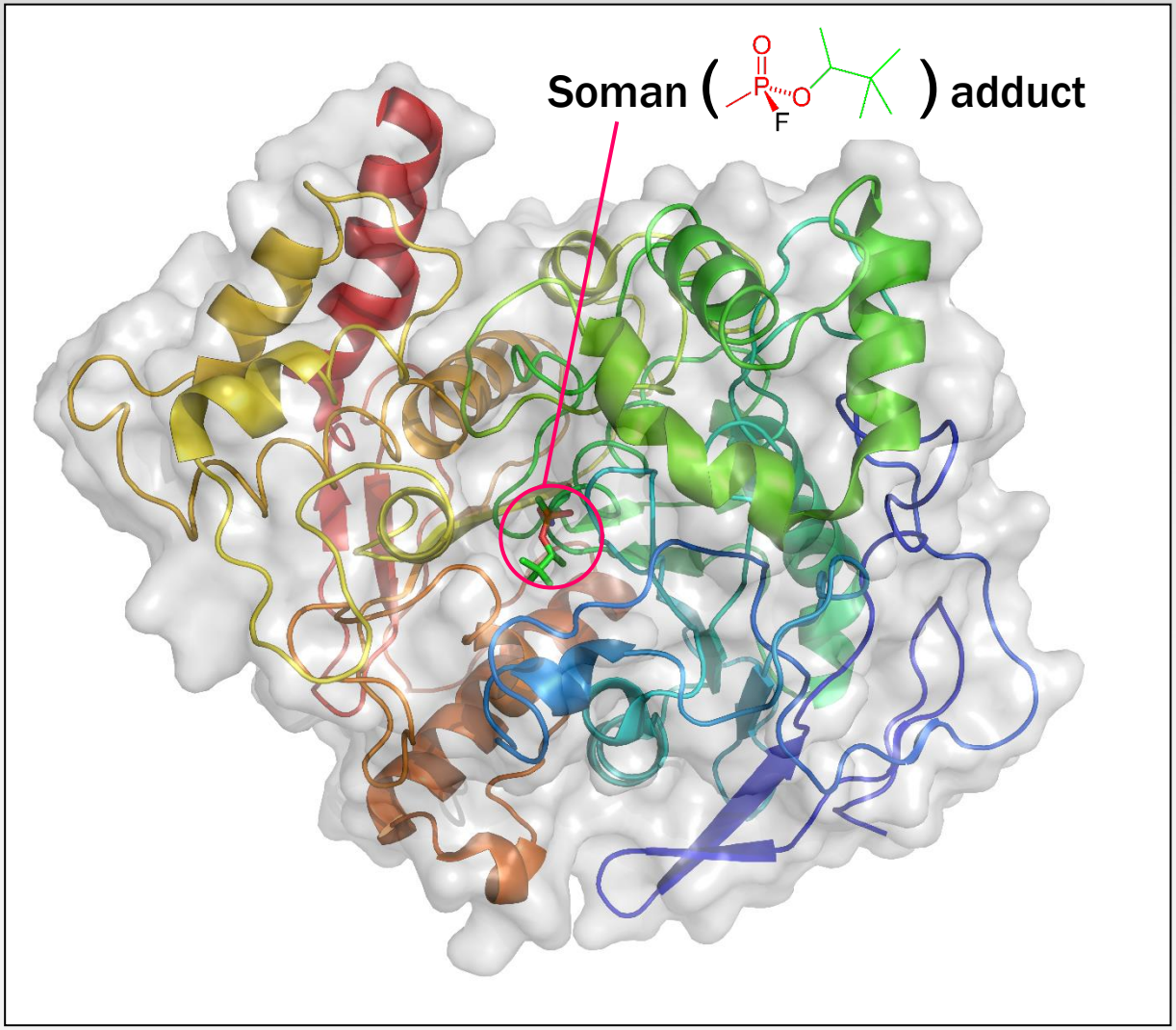
Table 4.2 Summary table of laboratory results for biomedical samples taken from one deceased individual

SN	Sample	Laboratory 1 Sarin and its metabolites	Laboratory 2 Sarin and its metabolites
1	Hair	Positive	Positive
2	Kidney	Positive	Positive
3	Skin	Positive	Positive
4	Blood	Positive	Positive
5	Liver	Positive	Positive
6	Breast fat	Positive	
7	Muscle	Positive	
8	Bronchus	Positive	Positive
9	Lung	Positive	Positive
10	Eye	Positive	
11	Brain	Positive	Positive
12	Heart	Positive	

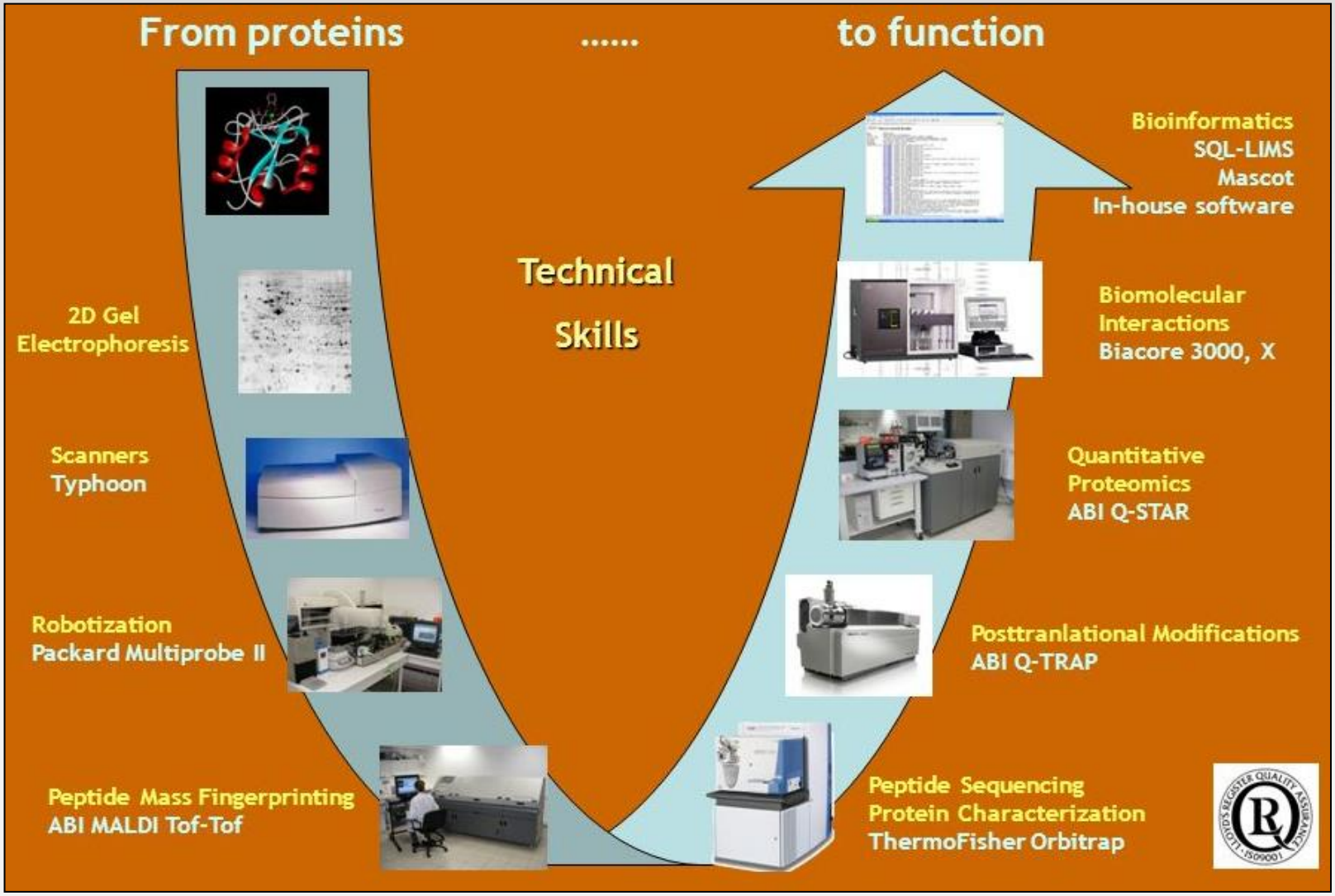
Note: Identification is positive when either the Sarin metabolite isopropyl methylphosphonic acid (IMPA) or the fluoride reactivation product of IMPA (Sarin) is detected.

From: Final Report of United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic (13 December 2013)

Chemical Signatures in a Biological System



Tools for Protein Analysis



The Chemistry of Countermeasures