Building Broader and Deeper Links Between OPCW and IUPAC

by Richard M. Hartshorn and Jonathan Forman

The Organisation for the Prohibition of Chemical Weapons (OPCW) and the International Union of Pure and Applied Chemistry (IUPAC) have recently signed a Memorandum of Understanding (MoU) wherein they have agreed to cooperate towards achieving their common goals, particularly in promoting chemistry for peaceful purposes and facilitating the exchange of scientific and technical information in support of their work (see <https://iupac.org/iupac-opcw-take-partnership-new-level/>). It was our belief that the cooperation outlined in the MoU between OPCW and IUPAC will be significantly advanced if more people in our organisations know more about how the other one operates and about the institutional frameworks, and detailed priorities, that affect their work. We have therefore initiated a project

with this object in mind (<https://iupac.org/project/2018-022-3-020>). This article outlines the detail of the project, and reports on progress from the first stage.

OPCW is a relatively young organisation (established in 1997) which serves as the implementing body of the Chemical Weapons Convention; an international disarmament and non-proliferation treaty. This treaty is intended to achieve a world that is free of chemical weapons and of the threat of their use; its ultimate aim is the complete elimination of chemical weapons. Through implementation of this treaty, the OPCW contributes to international security and stability, and promotes a world in which cooperation in chemistry for peaceful purposes is fostered for all. OPCW oversees and verifies the destruction of chemical weapon stockpiles; performs inspections of chemical facilities within the territories of the Member States of the treaty to verify compliance; investigates and collects information related to accusations of use of chemical weapon; and facilitates the provision of assistance protection from

Periodic Table of States Parties to the Chemical Weapons Convention

In Honour of the International Year of the Periodic Table of Chemical Elements 2019

In Honour of the International Year of the Periodic Table of Chemical Elements 2019

1 SE Sweden 17/06/1993	2 NO Norway 07/04/1994																	3 AU Australia 06/05/1994	4 ES España 03/08/1994	5 BG Bulgaria 10/08/1994	6 DE Deutschland 27/12/1994	7 MX México 29/08/1994	8 GR Grecia 15/02/1995	9 RO Romania 15/02/1995	10 FR Francia 02/03/1995																																																																																																																																																																																																																																																																									
		Order of Entry into Force		Country Symbol		Country Element		Date of Deposit																		11 HR Hrvatska 23/05/1995	12 MC Monaco 01/06/1995	13 DZ Argelia 14/04/1995	14 AT Austria 23/08/1995	15 PL Polonia 23/08/1995	16 JP Japón 25/04/1995	17 CA Canadá 26/06/1995	18 AR Argentina 02/07/1995																																																																																																																																																																																																																																																																	
		LEGEND																								19 NA Namibia 24/11/1995	20 IT Italia 08/12/1995	21 CI Côte d'Ivoire 18/12/1995	22 MA Marrocos 28/12/1995	23 BR Brasil 13/03/1996	24 GB Reino Unido 13/05/1996	25 MD Moldavia 08/07/1996	26 PT Portugal 10/09/1996	27 HU Hungría 31/10/1996	28 PH Filipinas 31/12/1996	29 BE Bélgica 27/01/1997	30 LU Luxemburgo 27/01/1997	31 TN Túnez 15/04/1997	32 TG Togo 23/04/1997	33 CN China 25/04/1997	34 US Estados Unidos 25/04/1997	35 ZW Zimbabue 25/04/1997	36 IS Islandia 28/04/1997																																																																																																																																																																																																																																																							
																										37 ML Malaui 28/04/1997	38 MT Malta 28/04/1997	39 FJ Fiji 20/01/1998	40 MU Mauricio 09/02/1998	41 AL Albania 11/05/1998	42 CK Cook Islands 15/02/1998	43 LK Sri Lanka 19/08/1998	44 PY Paraguay 01/12/1998	45 TJ Tayikistán 11/03/1999	46 MN Mongolia 17/03/1999	47 FI Finlandia 07/02/1999	48 CH Suiza 10/03/1999	49 NL Países Bajos 30/06/1999	50 DK Dinamarca 13/07/1999	51 PE Perú 20/07/1999	52 EC Ecuador 06/05/1999	53 ZA Sudafrica 13/09/1999	54 SK Eslovaquia 17/10/1999																																																																																																																																																																																																																																																							
																										55 SV El Salvador 30/10/1999	56 GE Georgia 27/11/1999	57 CZ República Checa 05/02/1999	58 RU Rusia 05/11/1997	59 NP Nepal 03/12/1997	60 VE Venezuela 09/12/1997	61 MR Mauritania 08/02/1998	62 BH Baréin 28/04/1997	63 AM Armenia 27/01/1997	64 LC San Vicente y las Granadinas 09/04/1997	65 LV Letonia 23/07/1996	66 LA Laos 25/02/1997	67 SZ Suazilandia 20/11/1996	68 MV Maldivas 31/05/1994	69 TM Timor-Leste 25/07/1999	70 LS Lesoto 07/12/1994	71 UZ Uzbekistán 23/07/1996	72 BA Bosnia y Herzegovina 25/02/1997																																																																																																																																																																																																																																																							
																										73 UY Uruguay 05/10/1994	74 KE Kenia 24/07/1994	75 SA Arabia Saudí 09/08/1998	76 OM Omán 08/02/1995	77 LT Lituania 15/04/1998	78 BJ Benín 14/05/1998	79 GM Gambia 19/05/1998	80 MW Malaui 25/06/1998	81 TZ Tanzania 30/06/1998	82 SN Senegal 03/07/1998	83 BO Bolivia 14/08/1998	84 CY Chipre 28/08/1998	85 BW Botswana 31/08/1998	86 BI Burundi 04/09/1998	87 VN Vietnam 08/09/1998																																																																																																																																																																																																																																																										
																										88 SR Surinam 28/04/1997	89 CU Cuba 29/04/1997	90 TR Turquía 29/04/1997	91 PA Panamá 07/10/1998	92 UA Ucrania 14/10/1998	93 ID Indonesia 12/11/1998	94 AD Andorra 27/02/2003	95 TL Timor-Leste 07/05/2003	96 TO Tonga 29/05/2003	97 CG Congo 04/12/2007	98 GW Guinea-Bisáu 20/05/2008	99 LB Líbano 20/11/2008	100 PG Papua Nueva Guinea 17/04/1996																																																																																																																																																																																																																																																												
																										101 ET Etiopía 13/05/1996	102 CR Costa Rica 24/06/1996	103 IE Irlanda 24/06/1996	104 BY Bielorrusia 11/07/1996	105 CL Chile 12/07/1996	106 NZ Nueva Zelanda 15/07/1996	107 IN India 03/09/1996	108 CM Caméru 16/09/1996	109 NE Níger 09/09/1997	110 BD Bangladesh 25/04/1997	111 GQ Guinea Ecuatorial 25/04/1997	112 KR Corea del Sur 28/04/1997	113 SC Seychelles 07/04/1993	114 SG Singapur 29/07/1997	115 KW Kuwait 29/07/1997	116 GN Guinea 09/06/1997	117 SI Eslovenia 11/06/1997	118 MK Macedonia del Norte 20/06/1997	119 TT Trinidad y Tobago 24/06/1997	120 BF Burkina Faso 08/07/1997																																																																																																																																																																																																																																																					
																										121 GH Ghana 09/07/1997	122 BN Brunei 28/07/1997	123 QA Catar 30/09/1997	124 GY Guyana 25/04/1997	125 PK Pakistán 30/10/1997	126 JO Jordania 29/10/1997	127 IR Irán 03/11/1997	128 VA Vaticano 12/05/1999	129 NG Nigeria 20/05/1999	130 SD Sudán 24/05/1999	131 SA Arabia Saudí 09/06/1999	132 EE Estonia 01/12/1999	133 FM Micronesia 05/11/1999	134 NI Nicaragua 01/12/1999	135 LI Liechtenstein 24/11/1999	136 SM San Marino 10/12/1999	137 ER Eritrea 24/02/2000	138 AZ Azerbaiyán 29/02/2000	139 KZ Kazajistán 23/03/2000	140 CO Colombia 05/04/2000	141 MY Malasia 29/04/2000	142 SL Sierra Leona 30/09/2004	143 MG Madagascar 26/10/2004																																																																																																																																																																																																																																																		
																										144 AF Afganistán 24/08/2003	145 ST San Tomé y Príncipe 25/08/2003	146 KG Kirguistán 25/08/2003	147 CV Cabo Verde 15/10/2003	148 BZ Belice 09/01/2004	149 LY Libia 09/01/2004	150 TV Tuvalu 19/01/2004	151 TD Chad 19/01/2004	152 RW Ruanda 31/03/2004	153 MH Islas Marshall 19/05/2004	154 KN Kiribati 21/05/2004	155 SB Islas Salomón 23/09/2004	156 SL Sierra Leona 30/09/2004	157 MG Madagascar 26/10/2004	158 IQ Irak 13/01/2009	159 DO Dominica 27/03/2009	160 BS Bahamas 21/04/2009	161 SO Somalia 29/05/2013	162 SY Siria 14/09/2013	163 MM Myanmar 06/07/2015	164 AO Angola 16/09/2015	165 PS Palestina 17/05/2018	166 PG Papua Nueva Guinea 17/04/1996	167 ET Etiopía 13/05/1996	168 CR Costa Rica 24/06/1996	169 IE Irlanda 24/06/1996	170 BY Bielorrusia 11/07/1996	171 CL Chile 12/07/1996	172 NZ Nueva Zelanda 15/07/1996	173 IN India 03/09/1996	174 CM Caméru 16/09/1996	175 NE Níger 09/09/1997	176 BD Bangladesh 25/04/1997	177 GQ Guinea Ecuatorial 25/04/1997	178 KR Corea del Sur 28/04/1997	179 SC Seychelles 07/04/1993	180 SG Singapur 29/07/1997	181 KW Kuwait 29/07/1997	182 GN Guinea 09/06/1997	183 SI Eslovenia 11/06/1997	184 MK Macedonia del Norte 20/06/1997	185 TT Trinidad y Tobago 24/06/1997	186 BF Burkina Faso 08/07/1997	187 GH Ghana 09/07/1997	188 BN Brunei 28/07/1997	189 QA Catar 30/09/1997	190 GY Guyana 25/04/1997	191 PK Pakistán 30/10/1997	192 JO Jordania 29/10/1997	193 IR Irán 03/11/1997	194 VA Vaticano 12/05/1999	195 NG Nigeria 20/05/1999	196 SD Sudán 24/05/1999	197 SA Arabia Saudí 09/06/1999	198 EE Estonia 01/12/1999	199 FM Micronesia 05/11/1999	200 NI Nicaragua 01/12/1999	201 LI Liechtenstein 24/11/1999	202 SM San Marino 10/12/1999	203 ER Eritrea 24/02/2000	204 AZ Azerbaiyán 29/02/2000	205 KZ Kazajistán 23/03/2000	206 CO Colombia 05/04/2000	207 MY Malasia 29/04/2000	208 SL Sierra Leona 30/09/2004	209 MG Madagascar 26/10/2004	210 AF Afganistán 24/08/2003	211 ST San Tomé y Príncipe 25/08/2003	212 KG Kirguistán 25/08/2003	213 CV Cabo Verde 15/10/2003	214 BZ Belice 09/01/2004	215 LY Libia 09/01/2004	216 TV Tuvalu 19/01/2004	217 TD Chad 19/01/2004	218 RW Ruanda 31/03/2004	219 MH Islas Marshall 19/05/2004	220 KN Kiribati 21/05/2004	221 SB Islas Salomón 23/09/2004	222 SL Sierra Leona 30/09/2004	223 MG Madagascar 26/10/2004	224 IQ Irak 13/01/2009	225 DO Dominica 27/03/2009	226 BS Bahamas 21/04/2009	227 SO Somalia 29/05/2013	228 SY Siria 14/09/2013	229 MM Myanmar 06/07/2015	230 AO Angola 16/09/2015	231 PS Palestina 17/05/2018	232 PG Papua Nueva Guinea 17/04/1996	233 ET Etiopía 13/05/1996	234 CR Costa Rica 24/06/1996	235 IE Irlanda 24/06/1996	236 BY Bielorrusia 11/07/1996	237 CL Chile 12/07/1996	238 NZ Nueva Zelanda 15/07/1996	239 IN India 03/09/1996	240 CM Caméru 16/09/1996	241 NE Níger 09/09/1997	242 BD Bangladesh 25/04/1997	243 GQ Guinea Ecuatorial 25/04/1997	244 KR Corea del Sur 28/04/1997	245 SC Seychelles 07/04/1993	246 SG Singapur 29/07/1997	247 KW Kuwait 29/07/1997	248 GN Guinea 09/06/1997	249 SI Eslovenia 11/06/1997	250 MK Macedonia del Norte 20/06/1997	251 TT Trinidad y Tobago 24/06/1997	252 BF Burkina Faso 08/07/1997	253 GH Ghana 09/07/1997	254 BN Brunei 28/07/1997	255 QA Catar 30/09/1997	256 GY Guyana 25/04/1997	257 PK Pakistán 30/10/1997	258 JO Jordania 29/10/1997	259 IR Irán 03/11/1997	260 VA Vaticano 12/05/1999	261 NG Nigeria 20/05/1999	262 SD Sudán 24/05/1999	263 SA Arabia Saudí 09/06/1999	264 EE Estonia 01/12/1999	265 FM Micronesia 05/11/1999	266 NI Nicaragua 01/12/1999	267 LI Liechtenstein 24/11/1999	268 SM San Marino 10/12/1999	269 ER Eritrea 24/02/2000	270 AZ Azerbaiyán 29/02/2000	271 KZ Kazajistán 23/03/2000	272 CO Colombia 05/04/2000	273 MY Malasia 29/04/2000	274 SL Sierra Leona 30/09/2004	275 MG Madagascar 26/10/2004	276 AF Afganistán 24/08/2003	277 ST San Tomé y Príncipe 25/08/2003	278 KG Kirguistán 25/08/2003	279 CV Cabo Verde 15/10/2003	280 BZ Belice 09/01/2004	281 LY Libia 09/01/2004	282 TV Tuvalu 19/01/2004	283 TD Chad 19/01/2004	284 RW Ruanda 31/03/2004	285 MH Islas Marshall 19/05/2004	286 KN Kiribati 21/05/2004	287 SB Islas Salomón 23/09/2004	288 SL Sierra Leona 30/09/2004	289 MG Madagascar 26/10/2004	290 IQ Irak 13/01/2009	291 DO Dominica 27/03/2009	292 BS Bahamas 21/04/2009	293 SO Somalia 29/05/2013	294 SY Siria 14/09/2013	295 MM Myanmar 06/07/2015	296 AO Angola 16/09/2015	297 PS Palestina 17/05/2018	298 PG Papua Nueva Guinea 17/04/1996	299 ET Etiopía 13/05/1996	300 CR Costa Rica 24/06/1996	301 IE Irlanda 24/06/1996	302 BY Bielorrusia 11/07/1996	303 CL Chile 12/07/1996	304 NZ Nueva Zelanda 15/07/1996	305 IN India 03/09/1996	306 CM Caméru 16/09/1996	307 NE Níger 09/09/1997	308 BD Bangladesh 25/04/1997	309 GQ Guinea Ecuatorial 25/04/1997	310 KR Corea del Sur 28/04/1997	311 SC Seychelles 07/04/1993	312 SG Singapur 29/07/1997	313 KW Kuwait 29/07/1997	314 GN Guinea 09/06/1997	315 SI Eslovenia 11/06/1997	316 MK Macedonia del Norte 20/06/1997	317 TT Trinidad y Tobago 24/06/1997	318 BF Burkina Faso 08/07/1997	319 GH Ghana 09/07/1997	320 BN Brunei 28/07/1997	321 QA Catar 30/09/1997	322 GY Guyana 25/04/1997	323 PK Pakistán 30/10/1997	324 JO Jordania 29/10/1997	325 IR Irán 03/11/1997	326 VA Vaticano 12/05/1999	327 NG Nigeria 20/05/1999	328 SD Sudán 24/05/1999	329 SA Arabia Saudí 09/06/1999	330 EE Estonia 01/12/1999	331 FM Micronesia 05/11/1999	332 NI Nicaragua 01/12/1999	333 LI Liechtenstein 24/11/1999	334 SM San Marino 10/12/1999	335 ER Eritrea 24/02/2000	336 AZ Azerbaiyán 29/02/2000	337 KZ Kazajistán 23/03/2000	338 CO Colombia 05/04/2000	339 MY Malasia 29/04/2000	340 SL Sierra Leona 30/09/2004	341 MG Madagascar 26/10/2004	342 AF Afganistán 24/08/2003	343 ST San Tomé y Príncipe 25/08/2003	344 KG Kirguistán 25/08/2003	345 CV Cabo Verde 15/10/2003	346 BZ Belice 09/01/2004	347 LY Libia 09/01/2004	348 TV Tuvalu 19/01/2004	349 TD Chad 19/01/2004	350 RW Ruanda 31/03/2004	351 MH Islas Marshall 19/05/2004	352 KN Kiribati 21/05/2004	353 SB Islas Salomón 23/09/2004	354 SL Sierra Leona 30/09/2004	355 MG Madagascar 26/10/2004	356 IQ Irak 13/01/2009	357 DO Dominica 27/03/2009	358 BS Bahamas 21/04/2009	359 SO Somalia 29/05/2013	360 SY Siria 14/09/2013	361 MM Myanmar 06/07/2015	362 AO Angola 16/09/2015	363 PS Palestina 17/05/2018	364 PG Papua Nueva Guinea 17/04/1996	365 ET Etiopía 13/05/1996	366 CR Costa Rica 24/06/1996	367 IE Irlanda 24/06/1996	368 BY Bielorrusia 11/07/1996	369 CL Chile 12/07/1996	370 NZ Nueva Zelanda 15/07/1996	371 IN India 03/09/1996	372 CM Caméru 16/09/1996	373 NE Níger 09/09/1997	374 BD Bangladesh 25/04/1997	375 GQ Guinea Ecuatorial 25/04/1997	376 KR Corea del Sur 28/04/1997	377 SC Seychelles 07/04/1993	378 SG Singapur 29/07/1997	379 KW Kuwait 29/07/1997	380 GN Guinea 09/06/1997	381 SI Eslovenia 11/06/1997	382 MK Macedonia del Norte 20/06/1997	383 TT Trinidad y Tobago 24/06/1997	384 BF Burkina Faso 08/07/1997	385 GH Ghana 09/07/1997	386 BN Brunei 28/07/1997	387 QA Catar 30/09/1997	388 GY Guyana 25/04/1997	389 PK Pakistán 30/10/1997	390 JO Jordania 29/10/1997	391 IR Irán 03/11/1997	392 VA Vaticano 12/05/1999	393 NG Nigeria 20/05/1999	394 SD Sudán 24/05/1999	395 SA Arabia Saudí 09/06/1999	396 EE Estonia 01/12/1999	397 FM Micronesia 05/11/1999	398 NI Nicaragua 01/12/1999	399 LI Liechtenstein 24/11/1999	400 SM San Marino 10/12/1999	401 ER Eritrea 24/02/2000	402 AZ Azerbaiyán 29/02/2000	403 KZ Kazajistán 23/03/2000	404 CO Colombia 05/04/2000	405 MY Malasia 29/04/2000	406 SL Sierra Leona 30/09/2004	407 MG Madagascar 26/10/2004	408 AF Afganistán 24/08/2003

Dr Robert Mathews (University of Melbourne, a former Chair of the OPCW Scientific Advisory Board) highlights the October 2018 OPCW themed issue of *Pure and Applied Chemistry*, for which he was a contributing author, to diplomats at the Fourth Review Conference of the Chemical Weapons Convention in The Hague, The Netherlands on 22 November 2018. Photo courtesy of OPCW.

the effects of chemical weapons at the request of Member States. OPCW also encourages international cooperation in peaceful uses of chemistry, and facilitates a number of programmes to assist scientists in Member States (see www.opcw.org/resources/capacity-building). In order to achieve these goals, OPCW seeks to secure universal membership, and is close to achieving this, as its roster of 193 States Parties leaves only four of the world's internationally recognized States outside of the Chemical Weapons Convention.

IUPAC is a nongovernmental, nonprofit global organisation that provides objective scientific expertise and develops the essential tools for the application and communication of chemical knowledge for the benefit of humankind. IUPAC seeks to foster sustainable development, provide a common language for chemistry, and advocates for the free exchange of scientific information, and values scientific excellence, objectivity, and the highest standards of transparent, responsible, and ethical behavior. Indeed, IUPAC and OPCW have collaborated on such issues long before the MoU was signed, with projects on a code of conduct for chemistry in 2005 (see *Pure Appl. Chem.*, **2006**, 78(11), 2169-2192, DOI: 10.1351/pac200678112169), and the drafting of the Hague Ethical Guidelines in 2015 (see www.opcw.org/hague-ethical-guidelines).

In a recent editorial, Richard M. Hartshorn examined the question of whether IUPAC, a much older organisation (established in 1919), was a large or small organization (*Chem Int*, July 2018, 40(3), pp. 2-3. DOI:10.1515/ci-2018-0301). In terms of formal membership, IUPAC is far smaller than OPCW (IUPAC currently has 55 full country members, so-called National Adhering Organizations), and it has only five paid staff. However, the real strength of IUPAC lies in the large group of expert scientist volunteers (over 2000) who are actively involved in the governance of IUPAC and in running its scientific projects—which also includes volunteers from countries that are not formal members of IUPAC. This contrasts significantly with OPCW,

which has approximately 500 staff, and a governance system which is largely based in the world of diplomats (of whom only relatively few have scientific training). OPCW has an associated scientific community as well; this is manifested through its 25 member Scientific Advisory Board which is comprised of scientists from 25 Member States, and a network of 26 international “Designated Laboratories” located across 19 of OPCW’s Member States that provide chemical analysis support for the work of the OPCW (see *Pure Appl. Chem.*, **2018**, 90(10), 1507-1525. DOI: 10.1515/pac-2018-0902).

The complementary nature of the two organisations offers the prospect of significant and productive collaboration, and this has indeed been underway. There has been significant collaborative work between the two organizations since the founding of the OPCW, this includes the ethical issues previously mentioned; the pursuit of the UN Sustainable Development Goals (see, for example: <https://www.opcw.org/media-centre/news/2018/12/experts-increase-cooperation-green-and-sustainable-chemistry-strengthen>); and, in collaboration with the OPCW Scientific Advisory Board, IUPAC has organized workshops for the Review Conferences of the Chemical Weapons Convention that take place every five years, starting from the first Review Conference in 2003. (See *Chem. Int.* July **2013**, 35(4), pp. 4-8. DOI: 10.1515/ci.2013.35.4.4 and ref therein) The outcomes of these workshops have been published in the IUPAC journal, (*Pure Appl. Chem.*, **2002**, 74(12), 2323-2352; **2008**, 80(1), 175-200; **2013**, 85(4), 851-881; 2018, 90(10), 1501-1506 and 1527-1557). These workshops have provided the basis for reports and recommendations to the Review Conferences from OPCW’s Scientific Advisory Board.

The OPCW Director-General addressed the World Chemistry Congress in 2017, OPCW staff members have participated in IUPAC conferences, and have been appointed to the IUPAC Committee on Chemistry Education (*ex-officio* member) and to send an observer to meetings of the Interdivisional Committee on Green

Project Place

Chemistry for Sustainable Development. The IUPAC President has delivered remarks to the States Parties of the Chemical Weapons Convention at the yearly Conference of States Parties since 2014, and a IUPAC representative has served as a permanent observer and contributor on the OPCW Advisory Board on Education and Outreach since its inception in 2016.

With this background we identified that, while there were connections, and previous collaborative activities between the two organisations, they were very dependent on the cross-memberships and in particular the individuals occupying those positions. This has additional significance in the context of the term-limits that exist in both organisations—OPCW's professional staff have a tenure limit of seven years, OPCW Scientific Advisory Board members serve for up to six years, and many IUPAC committees also have limits on total time served. A key way to mitigate this kind of situation is to ensure that more people have in-depth knowledge of the other organisation and the opportunity to meet and engage with staff in equivalent roles.

In this project we provided the opportunity for a full delegation of IUPAC scientists to attend the Fourth Review Conference of the Chemical Weapons Convention (held in November 2018 in The Hague), and in so doing to find out more about the staff structure of OPCW and the way that it operates. The delegation was made up of representatives from most IUPAC Divisions and Committees, and they had the opportunity to provide an outline of their areas of activity and expertise at a side-event of the Review Conference. The side-event was very well attended by diplomats from across many of the 193 States Parties (including

Qifeng Zhou	President
Richard Hartshorn	Secretary General
Ron Weir	Div I
Jan Reedijk	Div II
Nikolay Nifantiev	Div III
Marloes Peeters	Div IV
Hemda Garelick	Div VI
Vladimir Gubala	Div VII
Ed Constable	Div VIII
Jan Apotheker	CCE
Pietro Tundo	ICGCSD
Anna Makarova	COCI
Leiv Sydnes	ChemRAWN

IUPAC representatives having attended the Fourth Review Conference of the Chemical Weapons Convention and side events in The Hague in November 2018

Ambassadors Member Nations of the OPCW to the Netherlands) and OPCW staff (it was a standing room only event). The presentation, co-organized with OPCW staff can be accessed from the OPCW website or via <https://iupac.org/project/2018-022-3-020>.

As a result of interactions at the OPCW meetings, numerous additional connections have been made between the two organisations. For example, OPCW scientists will make connections with experts from Division VIII (Chemical Nomenclature and Structure Representation) to define and improve the names used for relevant chemicals, and the International Chemical Identifier (InChI) may find use in linking database entries and similar records. Similar issues were identified

IUPAC representatives speak at the Chemical Weapons Convention.
From left to right: Richard Hartshorn, Nikolay Nifantiev, and Ron Weir.

Clockwise from top left: Qifeng Zhou, Jan Reedijk, Hemda Garelick, Jonathan Forman, Pietro Tundo and Marloes Peeters.

in relation to polymers, and polymer science may find applications in sensors and wearable technology. It is clear also that there is potential for collaborations involving the OPCW Verification Division and the IUPAC Div III (Organic and Biomolecular Chemistry) in characterising and identifying metabolites (including bio-adducts) of toxic chemical exposure. This latter work might include involvement of scientists from OPCW Designated Laboratories.

As mentioned above, there are already OPCW-IUPAC links in the area of chemical education. As a result of this visit there was an opportunity for IUPAC volunteers to review and offer advice on a series of short videos that OPCW has prepared as part of a youth outreach project. The series “OPCW UpClose” can be found at: <https://www.opcw.org/opcw-upclose>, and aims to inspire young people with the possibilities of careers with OPCW and in other international organisations—while at the same time providing insights into the work of OPCW.

The second stage of the project will take place at the IUPAC Centenary General Assembly (GA), which will be held in Paris, in July 2019 and where the IUPAC Divisions and Standing Committees meet to review progress and identify new initiatives. OPCW observers will be present at these meetings and this will provide an opportunity to contribute new ideas and develop further collaborative projects. Just as being at the OPCW meetings provided the IUPAC delegation with insights into the structure and operation of OPCW, similar insights into IUPAC activities will be gained by the OPCW delegates attending the IUPAC GA. Furthermore, the GA is co-located with the IUPAC World

Chemistry Congress, and the OPCW delegation will also have the opportunity to engage with and contribute to the scientific programme of the Congress.

OPCW and IYPT2019

In honour of the International Year of the Periodic Table, OPCW has even given their own twist to this iconic symbol of chemistry, as a way to record the order in which the 193 States Parties joined the Chemical Weapons Convention in the “Periodic Table of the States Parties of the Chemical Weapons Convention.” Each “element” represents a State Party with “atomic numbers” that signify the order in which the Convention entered into force in the territories of the State. The dates signify when the signed treaty was deposited with the United Nations by each State. If you are looking for the Democratic people’s republic of Korea, Egypt, Israel or South Sudan, you will not find them in this table as these are the four States that have yet to join the OPCW (Israel has signed the Convention but it has not been ratified, the others have neither signed nor ratified).

Jonathan Forman <jonathan.forman@opcw.org> is Science Policy Adviser and Secretary to the Scientific Advisory Board in the Office of Strategy and Policy of the Organisation for the Prohibition of Chemical Weapons, The Hague, The Netherlands

Richard Hartshorn <rhartshorn@iupac.org> is Secretary General of the International Union of Pure and Applied Chemistry and a Professor of Chemistry in the School of Physical and Chemical Sciences of the University of Canterbury, Christchurch, New Zealand.

For more information, see www.iupac.org/project/2018-022-3-020