

# CBW

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रक्षा अध्ययन एवं विश्लेषण संस्थान

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# Editorial

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The Chemical Weapons Convention (CWC), the first ever multilateral disarmament agreement, came into force on April 29, 1997 along with the Organization for the Prohibition of Chemical Weapons (OPCW). 2017 marks the 20th anniversary of the establishment of both the CWC and the OPCW. Both these organizations have managed to eliminate around 93 percent of the world's chemical weapon stockpile and 192 countries are already members of the Convention.

But in spite of best efforts anomalies continue to occur. The first half of 2017 has witnessed two major chemical weapons nerve agent attacks, one in Malaysia and the other in Syria. But this has not deterred determined efforts to counter it. The events have brought the debate surrounding the potency of these agents to the forefront. There is also a need to discuss the ease with which these agents can be manufactured, in spite of being banned.

In this issue of the CBW Magazine Animesh Roul discusses this issue in detail. The magazine also looks at issues concerning *Yersinia pestis* which can cause the spread of various types of plague. Raymond Zilinskas discusses the possibility of various strains being developed by terrorist groups. John Hart deliberates on the action plan for the 4th Review Conference of the CWC which is scheduled to take place in 2018.

This issue also comprises other regular features like the Book Review, Kaleidoscope and Chemical and Biological News.

With our readers' feedback, we wish to publish issues in the future that focus on a subject of particular concern.

Contributions and feedback are welcome and can be addressed to: [editorcbw@gmail.com](mailto:editorcbw@gmail.com)

## Yersinia pestis, Biological Warfare, and Bioterrorism

Raymond A. Zilinskas

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### Summary

*Yersinia pestis* can cause any of three diseases – bubonic plague, pneumonic plague, and Septicemic plague. Bubonic and pneumonic plagues have in the past been weaponized by Japan and USSR. This article analyses whether terrorist groups will emulate these national biological warfare programs and thus will seek to develop weapons armed with *Y. pestis*.

### Preface

I teach a graduate seminar course at the Middlebury Institute of International Studies at Monterey titled “Chemical and Biological Weapons and Arms Control.” Last semester a student asked me, “Since the Japanese and Soviet biological warfare programs weaponized *Yersinia pestis*, is it possible that a terrorist group would follow their example and attempt to develop a biological weapon whose payload was *Y. pestis* bacteria”? I did not have an answer to the question, so I decided to conduct research whose objective was to prove or disprove the hypothesis: “It is likely that in the not too distant future, a terrorist group will utilize *Y. pestis* in an attack against a human population.”

### Introduction

In the historic literature there are many accounts of armies and armed bands having utilized *Y. pestis* for biological warfare (BW) purposes. The methods for waging BW were primitive, such as catapulting plague victims who were sick or had recently died and thus were infested by human fleas (*Pulex irritans*) that, in turn, carried *Yersinia pestis* (*Y. pestis*)<sup>1</sup> into the encampments of enemies.<sup>2</sup> After the plague victim’s body landed within the targeted area, the fleas would escape its lifeless host and seek living animals for their meals of blood. When successful, the flea’s bite would convey *Y. pestis* cells into the new host. However, no modern military has used such methods for disseminating *Y. pestis* among its enemies, nor are they likely to be so used in the future. For this reason, I chose not to delve into ancient military history but limit my consideration to two BW methods that have been used in the 20<sup>th</sup> century and, possibly, might again be used in the future.

The first method is to disperse *Y. pestis* via a vector, for example human fleas such as *P. irritans*, amidst a targeted population. The second method involves dispersing *Y. pestis* cells as an aerosol onto the enemy's troop formations or civilian populations.

It must be made clear that when considering BW programs, their main objectives are to conduct research and development (R&D) for offensive purposes; i.e., to develop and produce biological weapons such as spray systems, bombs, rockets, or missiles whose payloads consist of bacterial or viral pathogens. Offensive BW programs are forbidden by international law, mainly the 1972 Biological and Toxin Weapons Convention (BWC).<sup>3</sup>

Conversely, biodefense R&D is permitted under international law, including the BWC. The products of biodefense programs are vaccines, therapeutics, diagnostics, and detectors that are used by nations to defend their populations against attacks utilizing biological weapons and should prevention fail, to treat its victims quickly and correctly. Countries that in the past have acquired offensive BW programs also conducted defensive programs to defend their populations from the BW agents their military scientists produce and from agents possibly possessed by adversaries. Of course, today when emerging infectious diseases and biological terrorism are world-wide existential threats, there are numerous countries that support biosecurity programs whose main objectives are to protect their populations from endemic, introduced, and emerging diseases and by doing so, they also are better prepared to meet the lesser threats of both bioterrorism and BW.

Before describing and discussing national BW programs, I believe it is useful to provide some background. Accordingly, this article has seven sections. First, I describe the

pathogen *Y. pestis* and the three forms of the disease it causes. The second section contains a short history of plague vaccines, while the third section contains an even shorter history of therapeutics. The fourth, fifth, and sixth sections address the historical BW programs of, respectively, Japan, the United States (U.S.), and the Union of Soviet Socialist Republics (USSR). Of these countries, Japan and the USSR chose to weaponize *Y. pestis* and use it to arm biological weapons,<sup>4</sup> while the U.S. decided not to weaponize *Y. pestis* but did investigate methods to defend against plague. In the seventh and last section I discuss reasons why *Y. pestis* currently is considered a dangerous threat agent by both military and civilian entities that are responsible for protecting their populations from infectious diseases and consider future developments that may result in weapons based on *Y. pestis* becoming elements of national or terrorist arsenals. By doing the last, the stated hypothesis is supported or refuted.

### ***Yersinia pestis* and Plague**

In nature, the pathogen named *Y. pestis* can cause any of three forms of plague depending on the route of infection – bubonic, pneumonic, or septicemic. The most common form of plague is bubonic plague, which humans most often contract after having been bitten by a flea infected with *Y. pestis*. After the pathogen enters the host's tissues, it is conveyed through the lymphatic system to lymph nodes where it replicates. The lymph nodes then become inflamed, rigid, and painful. When this occurs, the affected lymph nodes are visible as swellings that are called "bubos." In humans, bubos typically are most pronounced in armpits and groin. At advanced stages of the infection the bubos may burst, turning into suppurating open sores. Untreated victims of bubonic plague have a mortality rate between 60 and 80%.

Pneumonic plague is much rarer than bubonic plague and more deadly. Unlike bubonic plague that is spread most often by infected fleas, pneumonic plague is spread by *Y. pestis* cells that are carried in aerosols emitted by coughing and sneezing persons who already are sick with plague. Untreated pneumonic plague has a mortality rate close to 100%. For the purpose of this article, readers should know that the largest known outbreak of pneumonic plague occurred during 1910-1911 in Manchuria, with the first cases being detected in Harbin.<sup>5</sup> The number of persons who died during this outbreak is estimated to have been between 40,000 and 60,000.<sup>6</sup>

Septicemic plague is when *Y. pestis* cells circulate systemically in a victim's blood. Both the bubonic and pneumonic plague can convert to the septicemic form and when this occurs, untreated victims have a mortality rate is close to 100%. Even if treated with antibiotics, patients afflicted with septicemic plague are most likely to die.

### **History of Plague Vaccines<sup>7</sup>**

In the late 1890s, Pasteur Institute scientist Waldemar Haffkine worked for some time to develop a useful plague vaccine. In 1897, he released for general usage a so-called killed whole cell (KWC) vaccine.<sup>8</sup> The KWC vaccine was the main plague vaccine for most of the world for about 40 years and proved to be highly effective against bubonic plague but not against pneumonic plague. It is noteworthy that in 1947, the Department of Bacteriology at the Haffkine Institute, located in Mumbai, India, supplied 23.5 million ml of KWC plague vaccine, the highest production in the history of the Institute.<sup>9</sup> However, since a fairly high proportion of vaccine recipients suffered unpleasant side effects, in the 1940s an increasing number of health agencies prevailed on their governments to forbid the marketing of the

KWC vaccine, especially so when more effective and safer live whole cell (LWC) vaccines became available. One exception was that the U.S. developed a KWC vaccine, which is discussed below.

A LWC vaccine was first developed in 1906 by P. Strong who tested it the Philippines. It did not prove effective, but a successful LWC vaccine was developed by L. Otten in 1934 using the *Y. pestis* Tjiwedej strain that had been recovered from a dead rat. It proved highly efficient in South Africa, protecting about 80% of those persons who received it.<sup>10</sup> However, although effective against bubonic plague, it did not protect against pneumonic plague. A more effective LWC vaccine consisting of the *Y. pestis* EV strain was developed by Pasteur Institute scientist G. Girard and colleagues in the mid 1930s.<sup>11</sup> In effect, various variants of the EV strain vaccine continue to be used in many countries of the world to this day, especially by countries that previously were part of the USSR (see below).

The U.S. began a large effort to develop a plague vaccine after it entered World War II and thus sent hundreds of thousands of soldiers into regions of the world where plague was common. The Cutter Laboratories in Berkeley, California, was able to improve on Haffkine's KWC vaccine derived from a virulent strain of *Y. pestis* and produced an effective vaccine named USP. Over the years, Cutter scientists continued to improve on the USP vaccine, with vaccine A being in use during 1942-1951, vaccine B during 1950-1968, and vaccine C during 1968-1998. There were no plague cases during World War II among American soldiers who had been vaccinated. This fine record continued during the Viet Nam conflict. In the 1960s, Viet Nam was the world's leading country in plague incidents, so the exposure of Americans to plague was much greater than in World

War II. All American soldiers received the UPS vaccine C before entering the country and by the time that the conflict ended, just eight soldiers contracted plague, which was a rate hundreds of times less than among the Vietnamese.<sup>12</sup> Production of the UPS vaccine ceased in 1998 and since then, no plague vaccine for human use exists in the U.S.

R&D that aimed to create a LWC vaccine began in April 1943 when the U.S. Navy Medical Research Unit No. 1 located in Berkeley, California, led by Albert P. Krueger, was given the task to “study the offensive possibilities and defenses against the organism of Asiatic plague.”<sup>13</sup> By November 1944, the unit had made sufficient progress so that it was ready to attempt small scale pilot plant production of an avirulent strain of *Y. pestis* named A-1122. The largest reactor used for this purpose was 50 gallons (189 liters). The unit continued its work with *Y. pestis* into the 1970s, although in 1946 spun off some of it to the Department of Bacteriology, University of California at Berkeley (UCB).

In parallel with the investigations carried out by Krueger’s team, another team led by K.F. Meyer at the George Williams Hooper Foundation, University of California San Francisco, sought to improve both the Haffkine KWC vaccine and the EV LWC vaccine. This work, which continued into the 1970s, was supported by the Commission on Immunization of the Armed Forces Epidemiological Board.<sup>14</sup>

USSR scientists began work to develop a plague vaccine in 1936, when the Scientific Research Institute of Epidemiology and Hygiene at Kirov procured the avirulent *Y. pestis* EV strain from the Pasteur Institute in Antananarivo, Madagascar. By 1941, a team led by M.M. Faybich had developed methodology for keeping high immunogenicity of their line of the EV strain

at the initial level. The team developed a dry, live plague vaccine by using this line and methods for its large-scale production. This vaccine was called *Vaccinum pestosum vivum siccum*.<sup>15</sup> The Soviets claim to have produced and distributed 47 million doses of plague vaccine to Soviet armed forces during World War II. They also asserted that when the Red Army was preparing to invade Manchuria in August 1945, 8.5 million doses were manufactured for the specific purpose to vaccinate all soldiers in the Far East. Even though plague was endemic to this region, reportedly no Red Army soldier contracted plague on the Eastern front.<sup>16</sup> The researchers M.M. Faybich, I.A. Chalisov, and R.V. Karneev were awarded the State Prize of the USSR in 1945 for having developed the dry plague vaccine.<sup>17</sup> A LWC EV vaccine continues to be used to this day in Russia and most of the USSR’s former republics. The Stavropol Anti-plague Scientific Research Institute is the only producer in Russia of a LWC vaccine, which now is named EV NII EG.<sup>18</sup> Western countries have tended not to allow this vaccine to be used by their health providers because other vaccine strains derived from the EV76 line are known to cause a number of negative side effects.<sup>19</sup>

## Treating Plague

The German scientist C. Domagk discovered the first sulfa drug, Prontosil, in 1935, which proved to be somewhat effective in treating plague. However, effective treatment of plague only became possible in 1946, when streptomycin, the first antibiotic that proved to be highly efficient against plague became generally available. Although streptomycin remain the drug of choice to treat plague, it can be replaced by the modern antibiotics gentamicin and doxycycline. Whichever antibiotic is used, it must be administered very soon after a person has been infected in order for the antibiotic to be effective.<sup>20</sup>

## Japanese Weaponization of *Yersinia pestis*

In the mid-1930s, the Japanese military secretly established the Kwantung Army Epidemic Prevention and Water Supply Department, whose code name was Unit 731, which was staffed with BW specialists drawn from the imperial Japanese army. This unit was commanded by a military physician, major Shiro Ishii, who was particularly interested in plague.<sup>21,22</sup> In 1936, Unit 731 moved from Japan and established its headquarters in the Pingfan district, which was located approximately 24 kilometers south-east of Manchuria's largest city, Harbin. When in 1940 the unit reached its full strength, it comprised of eight divisions that employed an estimated 3,000 persons. In addition to Unit 731, several other Japanese units deployed throughout occupied China were involved in developing biological weapons.<sup>23</sup> For example, Unit 100, headquartered near Hsinking, was established in 1936 and was led by veterinarian Yujiro Wakamatsu. Its responsibility was to develop weapons against animals. Yet another unit, Ei 1644, was established in 1939 under the cover name "Anti-epidemic Water Supply Unit" and headed by medical doctor Masuda Tomosada, was located in Nanking. Like Unit 731, it developed weapons against humans.

After the USSR entered the war against Japan in August 1945, the Red Army quickly overran Manchuria and in the process captured ten of Unit 731's servicemen and two from Unit 100. The 12 were charged with developing, manufacturing and using "bacteriological weapons" and were tried for these war crimes in Khabarovsk city during December 25-30, 1949. The extensive trial record was published in English in 1950.<sup>24</sup> The servicemen confessed that Units 731's and 100's specific functions were to investigate the weapons utility of the

pathogens that cause "plague, cholera, gas gangrene, anthrax, typhoid, and paratyphoid."<sup>25</sup> However, it is clear from their testimony that of the pathogens investigated by Unit 731, the highest priority was to weaponize *Bacillus anthracis* and *Y. pestis*. Accordingly, in this article I focus on *Y. pestis*.

The Japanese decided to concentrate on two methods for dispersing BW agents, one that used explosive force to disperse a formulation containing *Y. pestis* as an aerosol over targeted populations and a second type that depended on dispersing fleas infected with *Y. pestis* to cause bubonic plague in population centers. Of the two, more effort was spent on the second.

Unit 731's fermentation facility could produce 300 kg of *Y. pestis* cells in one production cycle. In parallel, the unit's entomologists developed methods for raising large numbers of fleas; they claimed to have been able to produce 40 million infected fleas per month, the weight of which was approximately 10 kg.

In 1947, a team of American investigators led by Herbert H. Fell, Chief of the Planning Pilot-Engineering Division at Fort Detrick, interviewed 24 former Unit 731 scientists and technicians. Team members learned that Unit 731 used captured prisoners of war and kidnapped Chinese citizens as subjects for laboratory and field experiments to determine infectious and lethal doses of *Y. pestis*. In the laboratory, pathogens were introduced into human subjects by direct injection, oral preparations, inhalation of aerosols, or bites by fleas carrying *Y. pestis*. The findings were as follows:

$ID_{50}$  was  $10^{-6}$  milligrams (mg) subcutaneously and 0.1 mg orally.<sup>26</sup> Respiration for 10 seconds of air containing  $5 \text{ mg/meter}^3$  was infectious to

80% of exposed persons. The incubation period was normally 3-5 days and death occurred 3-7 days after onset of fever. In most cases of artificially induced plague that terminated fatally, the usual bubonic form became pneumonic three days before death and then was highly contagious.<sup>27</sup>

The Japanese military progressed from conducting such fatal human experimentations against prisoners in a laboratory setting to doing so as part of open air field trials. Human subjects were tied to stakes in open fields and exposed to pathogens in one of three ways. First, they were forced to inhale pathogens that were dispersed as aerosols by sprayers mounted on aircraft or land vehicles. Second, Type 50 Uji bombs whose payloads consisted of pathogens would be placed in the middle of a circle consisting of stakes onto which subjects were tied and an explosive force would disseminate the payloads as explained below. Third, specially adapted Uji bombs would have payloads constituted by fleas infected with *Y. pestis* that would be dispersed by a carefully measured explosive force created by a primacord over a group of tied-up subjects. Briefly, the findings from open field trials were as follows: "The spraying trials proved ...that this method was highly effective, both with subjects held within a room and also exposed to bacilli spread from aircraft at low altitudes. Of the subjects used in these trials, 50-100% became infected and the mortality was at least 60%."<sup>28</sup> However, the two types of bomb experiments gave different results: "The conclusion from all the [explosive] bomb trials was that plague bacilli were not a satisfactory B.W. weapon due to their instability but that it was much more practical to spread plague by means of fleas."<sup>29</sup>

The Type 50 Uji bomb weighed 25 kg and held 10 liters of payload. The nose cone contained an impact delay fuze and a bursting tube loaded with 500 grams of TNT (see Figure 1). In cases when the tail fuze and the primacord failed to function, the explosive train in the nose would detonate when the bomb impacted on the ground and thus would disperse its payload.<sup>30</sup>

Approximately 500 bombs of this model were manufactured in 1940 and 1941, and extensive field trials were conducted during the period 1940 to 1942 at Unit 731's proving ground near Anta, Manchuria. Bombs were tested by static explosion and drop tests from aircraft. For the initial tests, bombs were filled with a dye solution and suspensions of nonpathogenic organisms. Later bomb trials were conducted using a suspension of *B. anthracis* spores as the payload. In drop tests with a wind velocity of 5 meters per second and bombs being detonated at an altitude of 200 to 300 meters, the payload would be dispersed over an area of 40-60 meters by 600-800 meters.

Some of the Type 50 Uji bombs were adapted to carry up to 30,000 fleas infected with *Y. pestis* as payload. The dispersal method for the explosive opening of the bomb had to be reworked so that it did not kill the fleas. The adapted bomb was wrapped with a 4-meter long primacord; a fuze would explode the primacord at an altitude of 200 to 300 meters, thus liberating the bomb's payload.<sup>31</sup> After many trials field trials at Anta, the dispersal method was perfected to the point that 80% of the fleas survived this dispersal method. The adapted Uji bombs probably were the most effective biological weapons developed and used by the Japanese in terms of being able to sicken and kill the largest number of targeted Chinese.

There were two groups of victims of Japanese BW. The first group was constituted by persons that Unit 731 used as subjects in their inhumane laboratory experiments that involved infecting subjects with different pathogens and recording the results. Human subjects were also used in open field tests of candidate biological weapons in order to learn which of them were most effective. According to historical records, more than 3,000 Chinese anti-Japanese patriots, civilians, Soviet citizens, Mongolians and Koreans were used as human subjects and were inoculated with various pathogens by different methods, including passive oral infection, injection, bites by infected vectors, and exposure to aerosols created by exploding bombs.<sup>32</sup> Most of them died almost immediately, but some survivors were vivisected after they contracted various diseases.

The second group was Chinese civilians and soldiers. As noted above, Unit 731 manufactured large quantities of *Y. pestis* cells that were used to contaminate blood fed to many thousands of fleas. The fleas were emplaced in Uji bombs that were carried by aircraft and released on Chinese population centers. As a result, plague among humans and rats became epidemic in Chinese provinces. For example, in the Zhejiang, Jiangxi, Hunan, and Heilongjiang Provinces 1,814 people were infected, and 1,666 of them died.<sup>33</sup> As for the total number of Chinese deaths due to Japanese BW, one estimate by a Chinese scholar is that "...during Japan's invasion of China Biological Warfare activities were carried out in more than twenty provinces and cities, causing more than 200,000 casualties among the Chinese people."<sup>34</sup> As the Chinese public and delivery health systems largely disintegrated during World War II, it is probable that little or no plague vaccine or sulfa drugs were available to the Chinese population, so the casualty rate might even have been higher

than estimated by Liu Huaqui. While a large proportion of the Chinese population suffered greatly under Japan's barbarous occupation, it is clear, however, that Japan's usage of its biological weapons brought no advantageous military effects on the outcome of its aggressions in China and elsewhere.

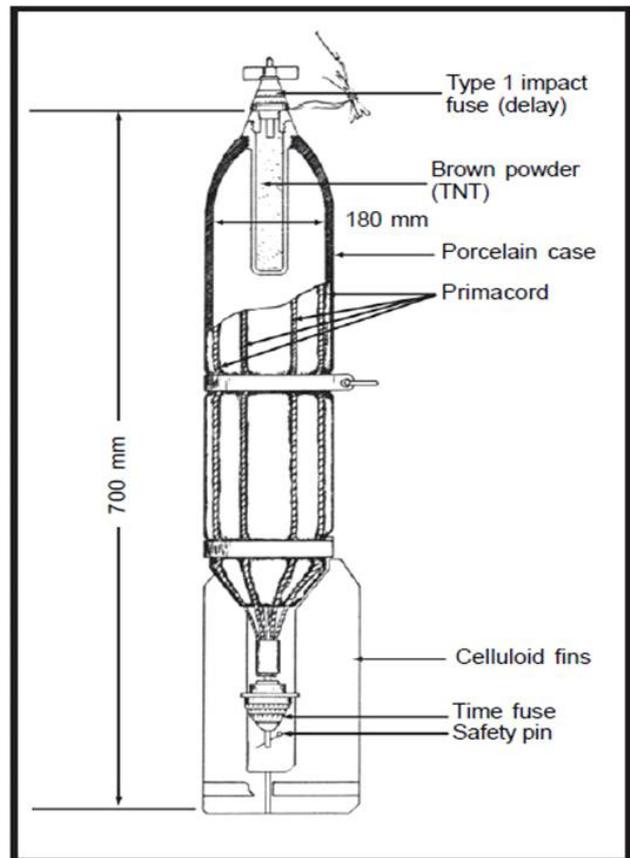


Figure 1: Type 50 Uji Bomb<sup>35</sup>

### The United States' Biological Warfare Program

The U.S. started its BW program in 1942, following the precedent set by the United Kingdom (U.K.) and Canada. The reason why these countries did so was that their intelligence agencies had incorrectly concluded that Germany had an operational BW program,<sup>36</sup> so they had to defend against its weapons and develop their own biological weapons so they would be ready to retaliate

in kind. It is ironic that the intelligence agency at the time perceived what did not exist, but they failed to uncover what did exist, namely the Japanese BW program. There certainly were intimations that Japan possessed biological weapons. For example, U.K. intelligence received information from John B. Grant, who at that time was working at the All-India Institute of Hygiene and Public Health, Calcutta, that in December 1941 Japan had used bacteria "...during the Changteh incident in December 1941," the U.K. War Cabinet concluded "...that the allegations were propaganda and were not supported by the technical evidence supplied."<sup>37</sup> A different source appears to have supported Grant's observation. A dispatch issued by U.S. military intelligence reported that "...the Chinese military spokesman, Chungking, was accusing the Japanese of starting germ warfare. He said that on November 4th Japanese planes dropped food and clothing at Changteh, Hunan Province, and that persons who made use of these were taken ill and died with symptoms similar to those of bubonic plague."<sup>38</sup> In the event, the U.S. government decided that information provided by the Chinese was propaganda and therefore should not be taken seriously. So it was that the U.S. and U.K. only learned about the Japanese BW program after its defeat in August 1945.

According to Rosebury and Kabat, after World War II ended, the U.S. BW program conducted a study as to which pathogens should be considered as possible BW agents.<sup>39</sup> Eventually 39 agents were chosen for screening and out of these, *B. anthracis* and *Y. pestis* were given highest priority for weaponization as lethal agents. This is probably the reason why *Y. pestis* was studied intensively within the U.S. BW program and by scientists in other government laboratories as well as academic laboratories. One such project had already

started in July 1946 at the UCB, which was funded by the Office of Naval Research. The principal investigator was Albert P. Krueger. Krueger's team studied not only *Y. pestis*, but other pathogens that caused respiratory diseases such as *Mycobacterium tuberculosis*, *Diplococcus pneumoniae*, and *Corynebacterium diphtheria*.<sup>40</sup> Example of studies conducted by the Krueger team were behavior of *Y. pestis* in an airborne cloud, nutritional studies of *Y. pestis*, virulence and viability of *Y. pestis* during prolonged incubation in liquid culture, and the mutation of *Y. pestis* induced by camphor. After Krueger retired in 1957, the project was moved to the UCB School of Public Health where it remained until it was terminated in 1975. All the R&D conducted at the UCB was for defensive purposes.

Sometime during the 1950s, the decision was made by the U.S. BW program to give highest priority to weaponizing *B. anthracis* while *Y. pestis* was given a much lower priority. There seemed to have been four reasons for this decision, and these are spelled out in two reports published in 1952 and 1953 that once were classified but were declassified many years ago:

1. The first testing of *Y. pestis* strains using monkeys had indicated that the LD<sub>50</sub> was approximately 3,000. However, subsequent testing indicated that the LD<sub>50</sub> was actually 20,000 – 50,000, or even higher. This meant that *Y. pestis* was much less virulent than other bacterial pathogens such as *B. anthracis*.<sup>41</sup>
2. Substantial laboratory data evidenced that *Y. pestis* stored in wet solution had poor storage characteristics in this form.<sup>42</sup>
3. Laboratory data indicated that *Y. pestis* had been lyophilized and stored successfully, however data was conflicting

as to virulence yields. In some cases, a marked drop in virulence was observed after lyophilization and storage. Data from other tests indicated that *Y. pestis* strains could be lyophilized and stored with little loss in viability and virulence. Due to this conflicting data, more investigations were required to solve this issue.<sup>43</sup>

4. Open air testing done at the Dugway Proving Ground during March 1952 had as its objective to determine the characteristics of the *Y. pestis* A-1122 strain under field conditions. The result was that "low viable counts obtained under the conditions of these tests seem to indicate that this organism loses viability rapidly."<sup>44</sup>

There might have been other reasons than the foregoing four reasons why *Y. pestis* was never weaponized by the U.S. BW program, but the facts speak for themselves; i.e., by the time that President Richard Nixon closed down the BW program, it had weaponized seven agents for use against humans (see Table 2), but *Y. pestis* was not one of them. (The U.S. also weaponized three agents for use against crops – rice blast, rye stem rust, and wheat stem rust).<sup>45</sup>

In view of the U.S. not having weaponized *Y. pestis*, it is worthwhile to review the allegation that has been made by the Chinese and North Korean governments of the U.S. forces having used biological weapons during the Korean War.<sup>46</sup> The report of the so-called International Scientific Commission is filled with allegations of the American having waged BW during the Korean War, of which one example is presented here:

Since the beginning of 1952, numerous isolated foci of plague have appeared in North Korea, always associated with the sudden appearance of fleas and with the previous passage of American planes.

Seven of these incidents, the earliest dating from 11<sup>th</sup> Feb., were reported in SIA/1, and in six of them the presence of the plague bacteria in the fleas was demonstrated. Document SIA/4 added the statement that after a delivery of fleas to the neighborhood of Au Ju on the 18<sup>th</sup> Feb., fleas which were shown bacteriologically to contain *Pasteurella pestis*, a plague epidemic broke out at Bal-Nam-Ri in that district on the 25<sup>th</sup>. Out of a population of 600 in the village, 50 went down with plague and 36 died.<sup>47</sup>

Although little-remembered now, these charges produced enormous political repercussions at the time, with extensive debate in the United Nations in New York and international protests against the alleged U.S. use. A typical comment by *Pravda* in 1952 was that, "These bandits in generals' uniforms, the butchers in white gloves, the bloody bigots and traders in death who have unleashed the most inhuman carnage in history, warfare with the assistance of microbes, fleas, lice and spiders."<sup>48</sup>

In January 1998, a historian researching the archives of the Central Committee of the Communist Party of the Soviet Union (CPSU) discovered 12 documents containing detailed and authoritative evidence that the Korean War BW allegation was contrived and fraudulent.<sup>49</sup> One document dates from February 21, 1952, and the others from the period of April 13 to June 2, 1953. They describe the way in which the allegations were contrived by North Korean and Chinese officials and Soviet advisers, and include direct communications between the Central Committee of the CPSU to the Chinese and North Korean leaders, Mao Tse-tung and Kim Il-sung, and replies by the latter. For example, one document, from May 1953, opens with the following lines: "For Mao Zedong: The USSR Government and the Central Committee of the CPSU were misled.

The spread in the press of information about the use by the Americans of bacteriological weapons in Korea was based on false information. The accusations against the Americans were fictitious."<sup>50</sup>

More recently, a former Director of the Chinese People's Volunteers' Army Health Division, Wu Zhili, who was directly involved in public health issues during the Korean War had his account of the allegation published. Wu wrote his article in 1997, but it was not discovered until 2005. Furthermore, it was not published until November 2013, when the Chinese journal *Yan-Huang Chun Qiu/Yan-Huang Historical Review* did so. It is not possible to here reprint Wu's rather lengthy article, suffice it to state his conclusion:

This has been my silent regret for decades. There has been no other. I only feel sorry for the international scientists who signed their names. Perhaps I am too naive, because it is possible they knew the truth but obeyed the requirements of the political struggle. If it was like this then fine, but if not then they were deceived by me. I had unceasingly expressed my apology for them to Huang Kecheng [Chief of Staff in 1952]. Huang said, "You don't need to feel this way, this was political struggle! Furthermore, you have expressed your views on bacteriological warfare from the beginning. It was not an easy situation, and you were given responsibility too late."

I think there will be a day in history to speak clearly about this incidence. Now that I am an 83-years old man who knows the facts and is no longer on duty, it is fitting to speak out: the bacteriological war of 1952 was a false alarm.<sup>51</sup>

In view of the evidence provided here that the U.S. never weaponized *Y. pestis*, the information from the USSR archives that indicates that the USSR ambassador to Peking in 1952 knew that the allegation of the U.S. having waged BW in Korea was false and, most important, by Wu Zhili's thorough account of what really occurred in Korea, which was not BW, but to restate Wu's conclusion, "the bacteriological war of 1952 was a false alarm."

To finish this section, the U.K. and Canada closed down their offensive BW program during the 1950s, but retain substantial defensive capabilities to this day. The U.S. continued its offensive BW program until November 25, 1969 when President Richard Nixon terminated it by executive order.<sup>52</sup> Like the British and Canadians, the U.S. maintains a strong, encompassing defensive BW program to this day.

### **Weaponization of *Yersinia pestis* by the USSR**

The most complete history of the USSR's huge BW program and its implications for today's Russia has been told by Milton Leitenberg and Raymond A. Zilinskas.<sup>53</sup> They explained how this program had two generations with the first spanning 1928-1971 and the second 1972-1992. This article contains an abridged history of this program, with an emphasis on the weaponization of *Y. pestis*.

### **USSR's First Generation BW Program**

In 1925, the director of the USSR Military Chemical Agency, Dr. Yakov Fishman, set up a small BW laboratory in Moscow, eventually to be called the Scientific Research Institute of Health, and appointed Nikolay N. Ginsburg to be its head. In 1928 Fishman submitted a laboratory progress report to Commissar for Defense Kliment Y. Voroshilov that had four parts:<sup>54</sup> (1) a

description of Ginsburg's investigations that demonstrated the feasibility of BW; (2) an assessment of the potential uses of bacteria for purposes of warfare and sabotage; (3) a plan for the organization of military biology and (4) a second plan for organizing defenses against biological attacks. The second part included a description of how a team led by Ginsburg was attempting to increase the virulence and stability of *B. anthracis*, a pathogen they found well suited for purposes of BW since it is both virulent and hardy. The Ginsburg team also investigated the BW potential of *Vibrio cholerae* and *Y. pestis*. Unlike the Japanese BW program which utilized two forms for dispersing *Y. pestis*, by vectors and by aerosols, Soviet military scientists weaponized *Y. pestis* for aerosol dispersal only.

Fishman's report appears to have motivated the Revolutionary Military Council to issue a secret decree in 1928 that ordered the establishment of an offensive BW program.<sup>55</sup> Thus, the USSR's first generation BW program commenced. As a result of the decree's implementation, the USSR came to possess a large BW program before World War II. German intelligence learned from Soviet prisoners of war that this program was conducted in three institutes in the Moscow-region, including Ginsburg's Institute (renamed the Worker's and Peasant's Red Army [RKKA] Biotechnology Institute), four institutes in the Leningrad region, and an open air test site on Vozrozhdeniye Island in the Aral Sea.<sup>56</sup>

As noted above, in 1945 the Red Army captured 12 Unit 731 servicemen and learned a great deal from them about Japanese program. A Soviet BW scientist interviewed by one of the authors recalled some of what was learned:

Information from the Japanese was used for both BW purposes and for defense. The

Japanese reports were meticulously written and had complete information on their experiments involving many pathogens. We particularly found information on plague [bacteria] of interest because they had tested many strains for virulence not only on animals, but also humans. They also conducted experiments using different doses of agents. We [the Soviet Army] never tested on humans. So the Japanese data gave us information on strains that were virulent not only in animal models, but also in humans. So we could compare our strains with theirs and use those that were most virulent in humans for BW. At that time the level of microbiology was not so high, and scientists could not secure highly virulent genetically modified strains. So we worked with what we had from nature. For defense, we used their information on the immunological responses by humans to pathogens in developing vaccines and therapeutics. Moreover, the Japanese had good data on how organisms responded to formulations existing at that time.<sup>57</sup>

The USSR's first generation BW program can be characterized as having assessed known pathogens for the weapons potential and employed the three classical applied microbiology techniques – mutation, selection, and propagation – to weaponize the most promising candidates. By the time the first generation program merged into the second generation program, its scientists had weaponized five bacterial pathogens; *B. anthracis*, *Burkholderia mallei*, *Coxiella burnetii*, *Francisella tularensis*, and *Y. pestis*, as well as the Venezuelan Equine Encephalitis virus (VEEV), variola virus, and botulinum neurotoxin.

A team at the USSR Ministry of Defense (MOD) Scientific Research Institute of

Epidemiology and Hygiene at Kirov led by V. A. Lebedinsky and Yu.V. Chicherin focused on weaponizing *Y. pestis* in the 1960s. The main objective of this work was to develop an especially virulent *Y. pestis* strain that was resistant to the existing EV vaccine. The USSR BW program did have a *Y. pestis* strain validated for BW, and it is probable that the Lebedinsky-Chicherin team was its developer.<sup>58</sup>

In a related project, the same team in Kirov reportedly developed *Y. pestis* simulants based on strains of *Yersinia pseudotuberculosis* and *Yersinia enterocolitica*. Although strains of these zoonotic pathogens can cause low-order gastrointestinal disease in humans, other strains are non-pathogenic and thus could safely be used as simulants in open-air field tests.

### **USSR's Second Generation BW Program**

In 1971, the Central Committee of the Communist Party (CCCP) and the USSR Council of Ministers issued a decree, stamped "of special importance," that laid the foundation for the organization of a new system to acquire modern biological weapons.<sup>59</sup> The decree formally marked the beginning of USSR's "modern," second generation BW program. Soon thereafter, the MOD's Decree No. 99 established the 15<sup>th</sup> Directorate to direct the USSR's BW program and appointed Colonel General Yefim I. Smirnov as its head.<sup>60</sup> Further, the Politburo ordered the establishment of an entirely new organization named Biopreparat dedicated to BW that was comprised of five major institutes, as well as an unknown number of production plants and storage facilities. Although an ostensibly civilian organization, it received its orders from the 15<sup>th</sup> Directorate. Biopreparat's main

responsibility was to manage a large program codenamed "*Ferment*" (which translates to "Enzyme") whose objective was "...to develop a second generation of biological weapons using genetically modified strains, which would be of greater military value than existing natural strains. It planned to introduce new properties into diseases organisms, such as antibiotic resistance, altered antigen structure, and enhanced stability in the aerosol form, making delivery of the agent easier and more effective."<sup>61</sup> Further, a new and highly secret Interdepartmental Scientific-Technical Council on Molecular Biology and Genetics,<sup>62</sup> whose cover designation was P.O. Box A-3092,<sup>63</sup> was established to provide scientific direction to *Ferment*, and the highly regarded virologist and academician Victor M. Zhdanov was appointed its chairman.<sup>64</sup> In addition to *Ferment*, the USSR Ministry of Agriculture was ordered to operate a program codenamed *Ekology*, whose objective was to weaponize bacteria, fungi, and viruses for use against agriculturally important animals and crops.

*Ferment* initially focused on traditional agents, such as *B. anthracis*, *B. mallei*, *F. tularensis*, *Y. pestis*, variola virus, and VEEV, but within a few years its scientists also investigated filoviruses (especially Ebola and Marburg viruses), Junin virus, and Machupo virus.<sup>65</sup> Alongside its offensively directed R&D, Biopreparat Institutes performed defensively directed R&D under a program codenamed Problem 5 whose lead agency was the N.F. Gamaleya Institute of Epidemiology and Microbiology, but Problem 5's R&D was mostly performed by six institutes that comprised USSR's anti-plague system. Its major objective was to develop vaccines and treatments for the pathogens that *Ferment* weaponized and foreign threat agents discovered by Soviet intelligence. Two reports written by

researchers at the James Martin Center for Nonproliferation Studies contain the history and organization of the anti-plague system, including Problem 5.<sup>66</sup>

The USSR's BW program reached its apex in the late 1980s when it had four components. The first component was constituted by three military R&D institutes and an open air test site. The second was Biopreparat, which had five major research institutes and about 35 supporting facilities. The third was the Ministry of Agriculture with six research institutes and an unknown number of supporting facilities. And the fourth was Problem 5 as describe above. The BW program's civilian institutions are listed in Table 1. At that time, an estimated 60,000 persons operated USSR's BW program.

The R&D involving *Y. pestis* was mainly conducted at the MOD's Scientific Research Institute of Epidemiology and Hygiene at Kirov and Biopreparat's State Research Center for Applied Microbiology (SRCAM) located at a secret city called Obolensk. Since there have been no defectors from any of the three MOD's biological institutes, little is known about the BW-related R&D that was conducted within their walls. Conversely, many scientists who once worked for Biopreparat have either defected or, after the USSR dissolved in December 1991, succeeded in relocating to countries such as Israel, United Kingdom, United States, and elsewhere. Accordingly, there is a considerable amount of information about the R&D conducted by Biopreparat institutes.

The first two R&D objectives for SRCAM was for its scientists to (1) eliminate epitopes on the surface of classic BW agents so as to make them unrecognizable to the diagnostic techniques and vaccines possessed by Western countries,<sup>67</sup> and (2) to develop strains of *B. anthracis*, *B. mallei*, *B.*

*pseudomallei*, and *Y. pestis* that were resistant to ten antibiotics.<sup>68</sup>

In 1982, SRCAM scientists V.M. Krasilnikova, A.V. Karlyshev, and P.A. Cherepanov started to investigate the *Y. pestis* F1 antigen and, eventually, they were able to express F1 in *E. coli*.<sup>69</sup> One of outcomes of molecular cloning of *caf1* operon was a development of original method for generation of a so-called "F1 minus" strain of *Y. pestis*.<sup>70,71</sup> The reason for doing so was that in Western countries, standard serological tests have been used for many years to detect antibodies to the F1 protein and these tests are the basis for the surveillance and diagnosis of plague in infected humans and animals. By using a F1 minus strain of *Y. pestis* in their biological weapons, the Soviets would have made it more difficult for the attacked population to identify the causative pathogen of the resulting disease outbreak and begin timely treatment. A F1 minus strain of *Y. pestis* was indeed created, but it was taken over by MOD so its fate as a BW pathogen is unknown.

The first multiple antibiotic resistant strain of *B. anthracis* was successfully created in 1986. During 1987-1988, multiresistant antibiotic strains of *F. tularensis*, *B. mallei*, and *B. pseudomallei* were also created. The research that aimed to develop a multiresistant antibiotic strains of *Y. pestis* initially produced some promising results, but by the time the USSR's BW program was terminated in 1992, this line of research proved to be unsuccessful. It bears stressing that although multiresistant antibiotic bacterial strains were created, they were not tested in the open air at Aralsk 7, so their degree of efficiency as BW agents is not known.

A third approach involving *Y. pestis* was taken by I.V. Domaradsky. He had the idea

of transferring the gene that codes for diphtheria toxin into a militarily useful bacterium. This toxin, which is produced by the bacterial pathogen *Corynebacterium diphtheriae*, had the dual benefit of having a relatively simple chemical structure and being exceedingly toxic.<sup>72</sup> Within a fairly short time, he was able to clone the diphtheria toxin gene and transfer it into *Y. pseudotuberculosis*.<sup>73</sup> This was a substantial accomplishment since at that time *Y. pseudotuberculosis* was more difficult to engineer than *E. coli*. Domaradsky then wanted to undertake the same manipulation using *Y. pestis* as the recipient host for the cloned gene. He was not able to finish this work for unknown reasons, but according to another SRCAM scientist, in 1990 the diphtheria toxin gene was transferred into *Y. pestis*.<sup>74</sup> SRCAM scientists K.I. Volkovoy and P.A. Cherepanov reported that this construct proved to be highly virulent and immunosuppressive in monkeys.

The USSR relied on two mainstay biological weapons: a cluster submunition called the Gshch-304 (Ã-304), and a spray system.<sup>75</sup> Both were open air tested at Aralsk-7 with payloads that included *Y. pestis*.<sup>76</sup>

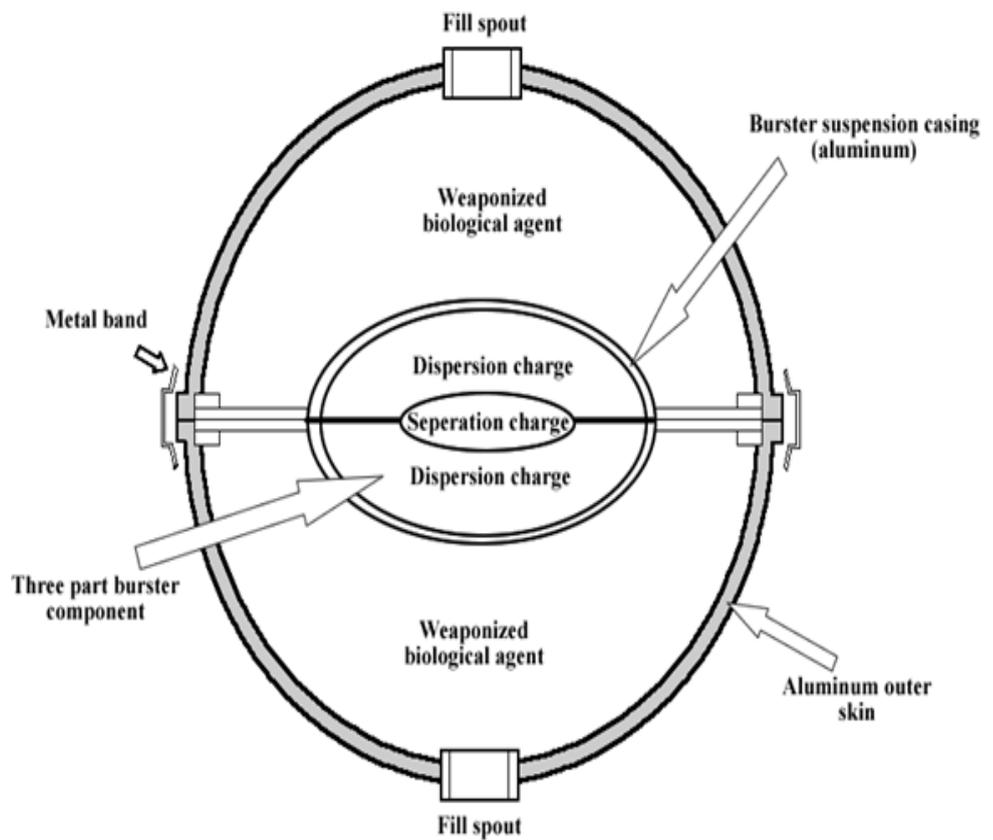


Figure 2. Gshch-304 (Ã-304) Bomblet (6-8 vanes are not pictured)<sup>77</sup>

After the USSR dissolved in December 1991, the new Russian President Boris Yeltsin eventually came to terms with the knowledge that the USSR had operated an offensive BW program in violation of the BWC.<sup>78</sup> In response, on April 11, 1992, he issued Edict No. 390, "On Ensuring the Implementation of International Obligations Regarding Biological Weapons," which ordered that the USSR's BW programs be shut down.<sup>79</sup> At approximately the same time, Yeltsin promulgated a decree that led to a 50% reduction in the staffing levels at the MOD and Biopreparat Institutes and a 30% cut in their funding. In actual practice an even more severe downsizing occurred, with individual institutes undergoing personnel decreases ranging from 50% to over 90%.

On the international level, in accordance with the confidence building measures agreed on by BWC state parties in 1986,<sup>80</sup> the Yeltsin government submitted Russia's confidence building Form F, which is a declaration on past activities in offensive and defensive biological research and development programs. The Form F submitted by Russia briefly described USSR's and Russia's offensive and defensive BW-related efforts from 1946 to March 1992 and identified some of the research institutions that been part of those efforts. It asserted that the USSR began dismantling its offensive facilities in 1986, which was also when Biopreparat was transferred from the MOD to the Ministry of Medical and Microbiological Industries. By April 1992, Aralsk 7 on Vozrozhdeniye Island had been dismantled and its infrastructure had been largely demolished. However, while the second was true, it was not so the first; i.e., the Soviet BW program continued as

before until 1992, at which time it shrunk because of the lack of funding noted above.

Finally, it bears noting that despite all evidence to the contrary, the Putin administration has asserted several times that the USSR never had an offensive BW program, claiming that it only operated a defensive program to protect against possible BW attacks. Even more disturbing was that shortly after having taken the oath of president for the second time, Putin forecasted: "What is the future preparing for us? ... In the more distant future, weapon systems based on new principles (beam, geophysical, wave, genetic, psychophysical and other technology) will be developed. All this will, in addition to nuclear weapons, provide entirely new instruments for achieving political and strategic goals. Such high-tech weapon systems will be comparable in effect to nuclear weapons but will be more "acceptable" in terms of political and military ideology."<sup>81</sup>

## **Table 1: Known Components of USSR's Civilian BW System Circa 1986**

### **R&D Institutes**

- All-Union Research Institute for Applied Microbiology (SRCAM) in Obolensk
- All-Union Research Institute of Molecular Biology (Vector) in Koltsovo
- All-Union Scientific Research Foot and Mouth Disease Institute, Vladimir
- All-Union Scientific Research Institute of Veterinary Virology and Microbiology, Pokrov
- Institute of Engineering Immunology (IEI), Lyubuchany
- Research and development facility of unknown name, Vladimir
- Research Institute of Highly Pure Biopreparations (IHPB) in Leningrad
- Scientific Institute of Phytopathology, Golitsyno
- Scientific Institute of Phytopathology, Tashkent, Uzbekistan SSR
- Scientific Research Agricultural Institute, Otar, Kazakhstan

## **Production and Mobilization Plants**

BerdsK Chemical Factory, BerdsK

*Biokombinat*, Georgia (anti-animal agents?)

*Biosintez* Combine, Penza

JSC "*Sakagrobiomretsvi*" (*Biokombinat*), Tabakhmela, Georgian SSR

Omutninsk Chemical Factory, Omutninsk

Production Facility "*Biokombinat*," Alma Ata, Kazakhstan SSR

Production plant of unknown name, Pokrov

"Progress" Plant, Stepnogorsk

Scientific and Production Base, Omutninsk

Scientific and Production Base of the Siberian Branch of the Institute of Applied Biochemistry, BerdsK

Scientific Experimental and Production Base (SNOPB), Stepnogorsk

Scientific-Research Technological Institute of Biologically Active Substances (IBAS), BerdsK

*Sintez* Combine, Kurgan

## **Special Weapons and Facility Design Units**

All-Union Institute for Biological Instrument Development (*Biopribor*), Moscow

Institute of Applied Biochemistry, Moscow

Institute for Biochemical Technological Development (*Biokhimmash*), Moscow

Scientific-Research Technological Design Institute of Biologically Active Substances (IBAS), BerdsK

Special Design Bureau of Controlling Instruments and Automation, Yoshkar-Ola

Special Design Bureau for Precision Machinery Building, Kirishi

State Institute for the Design of Enterprises of the Biological Industry (*Giprobioprom*), Moscow

Unknown name, Posyolok Volginsky (or Poselok Volginsky)

## **Antiplague Institutes<sup>82</sup>**

Central Asian Scientific Research Anti-Plague Institute, Alma Ata

Stavropol Research Anti-Plague Institute, Stavropol

Anti-Plague Research Institute for Siberia and the Far East, Irkutsk

Rostov Research Anti-Plague Institute, Rostov-on-Don

Volgograd Research Anti-Plague Institute, Volgograd

Russian Research Anti-Plague Institute "Microbe", Saratov

**Table 2: Lists of Anti-personnel Agents Validated for Biological Weapons by U.S. and USSR**

<u>U.S.</u>	<u>USSR</u>
<b>Bacteria</b>	
<i>Bacillus anthracis</i>	<i>Bacillus anthracis</i>
<i>Brucella suis</i>	<i>Brucella</i> species
Coxiella burnetii	Coxiella burnetii
<i>Francisella (Pasteurella) tularensis</i>	<i>Francisella tularensis</i>
	<i>Pseudomonas mallei</i>
	<i>Pseudomonas pseudomallei</i> (?)
	<i>Yersinia pestis</i>
<b>Viruses</b>	
	Marburg virus
Venezuelan Equine Encephalomyelitis virus	Venezuelan Equine Encephalomyelitis virus
	Variola virus
<b>Toxins</b>	
Botulinum neurotoxin	Botulinum neurotoxin
Staphylococcal enterotoxin B	Staphylococcal enterotoxin B

## ***Yersinia pestis* as a Current Threat Agent**

In 2014, the World Health Organization (WHO) reported that in 2013 there were 783 plague cases worldwide, including 126 deaths.<sup>83</sup> Most plague cases occurred in three countries – the Democratic Republic of Congo, Madagascar, and Peru. The low number of plague cases, and their far-off sites, clearly demonstrate that in our time plague has largely disappeared as a major public health threat. Yet, the U.S. Centers for Disease Control and Prevention (CDC) has designated *Y. pestis*, along with four other pathogens and one toxin,<sup>84</sup> as a highly dangerous Category A threat agent. Why is this so?

According to the CDC, all Category A agents possess certain characteristics that add up to them being perceived as posing significant risks to national security. These characteristics are:

- They can be easily disseminated or transmitted from person to person;
- The diseases they cause result in high mortality rates and have the potential for major public health impact;
- Their appearance in a community might cause public panic and social disruption; and
- Their prevention requires special action for public health preparedness.<sup>85</sup>

I maintain that beside the four common characteristics, there is another compelling reason why *Y. pestis* in particular is a dangerous threat agent and that is because two nations have weaponized it in the not too distant past. In other words, Japan and the USSR spent much effort and money to develop *Y. pestis* for the purpose of using it as payload in its biological weapons. They

would not have done so unless their military scientists were convinced that biological weapons armed with *Y. pestis* would have been useful to their militaries.

## **The Potential of *Y. pestis* for Bioterrorism**

*Y. pestis* is a zoonotic pathogen that is widely distributed in natural plague foci in Asia, Africa, western North America, and Eurasia. In the natural plague foci, there are more than 80 reservoirs with different kind of fleas as potential vectors and *Y. pestis* has at time been transmitted between reservoirs by infected fleas biting mammals. In many plague foci, it is not difficult for trained field workers to capture rodents that carry fleas infected with *Y. pestis*. Using standardized techniques still practiced today, a trained microbiologist can subsequently culture and isolate *Y. pestis*. In view of the many natural plague foci spread throughout the world, it is theoretically possible for terrorists to acquire *Y. pestis* from natural sources.

Nature is not the only source for *Y. pestis*; ill willed persons could steal cultures from laboratories and culture collections. In this regard, possibly the most substantial threat is posed by yet another component of the former USSR's BW program; namely, the anti-plague system. Its work, which was mostly defensive in nature, was cloaked in secrecy because the USSR considered information about endemic infectious disease to be state secrets. Actually, the anti-plague system had responsibilities that ranged beyond BW defense, including protecting the country from endemic and imported dread diseases such as plague, anthrax, tularemia, and Crimean-Congo hemorrhagic fever. As such, its researchers were among the few in the USSR that were permitted to work directly with the most dangerous bacterial and viral pathogens, strains which were stored in in-house culture collection.

After the USSR dissolved in December 1991, this system fragmented, with one anti-plague institute and many stations located outside Russia becoming part of the health systems of the newly independent nations. The main problem that attended this development was that Russia stopped funding most of these now foreign anti-plague facilities and their new home governments have not taken up the financial slack. One of the results of lack of funding is that the physical security that once protected facilities and culture collections deteriorated to near uselessness. For the newly independent nations (except Russia), a program initiated by the U.S. called the Cooperative Threat Reduction program has provided sufficient assistance required to safeguard the premises of anti-plague institutes and stations, including their culture collections.<sup>86</sup> Nevertheless, the possibilities exist that outsiders could break into anti-plague facilities and steal cultures of pathogens and use them as a basis for BW programs by terrorist groups. Alternatively, corrupt insiders could be paid by criminals to steal cultures from laboratories or cell culture collections. The proliferation issues posed by the anti-plague system as it now exists in many countries has been reported by CNS researchers.<sup>87</sup>

However, even if pathogens are acquired by terrorists or proliferant nations, it does not mean that the new owners possess a biological weapon. The information about weaponization of *Y. pestis* that emanated from Japan, USSR, and the U.S. indicates that this process is a difficult one, mainly because this pathogen is fragile and therefore has to be formulated; i.e., certain chemicals are added to the bacterial cells that serve to protect them from desiccation and other stresses in order to be effectively disseminated onto targeted populations. The Japanese found that formulations used for a *Y. pestis* aerosol did not work well. As a result, their preferred biological weapon was

the Uji bomb carrying fleas infected with *Y. pestis*. I suspect that no terrorist group would have neither the expertise nor the will to deal with the problem of breeding and packaging the thousands of fleas required to disseminate *Y. pestis*.

As for the U.S., its BW program gave up on weaponizing *Y. pestis* and instead chose to weaponize bacterial pathogens that are easier to handle, are more lethal, and survive better as components of aerosols.

Soviet military scientists spent years to develop a formulation that protected the *Y. pestis* cells so instead of the half-life of unprotected cells being a few minutes in the open air, the formulated cells would have a half-life of 10-20 minutes depending on temperature and humidity.<sup>88</sup> No terrorist group would possess the expertise in aerobiology that the USSR had, and so even if they tried to produce a *Y. pestis* aerosol, they undoubtedly would fail. In addition, they probably would face substantial problems with biosafety; i.e., protecting their own operators from exposure to this deadly pathogen.

Based on lessons from the Japanese, U.S., and USSR BW programs, I conclude that it is not likely that *Y. pestis* will be used by a terrorist group in the near future to attack a human population. The more likely scenarios are that terrorists will use food-borne or beverage-borne pathogens or toxins to contaminate food items or beverages that are utilized by their targeted populations. Since botulinum neurotoxin can be purchased from Internet sources and because it is comparatively easy to manufacture, it might be the agent of choice for terrorists.<sup>89</sup> Another possibility is that a terrorist group will have learned from Aum Shinrikyo's failed approach to disperse aerosolized quantities of the avirulent Sterne strain of *B. anthracis* over Japanese urban

areas and instead conduct similar attacks but with a virulent *B. anthracis* strain.<sup>90</sup>

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### Endnotes:

- <sup>1</sup> For a long time, the pathogen that causes plague was called *Pasteurella pestis*. In 1944, it was proposed to change this name to *Yersinia pestis*, after its discoverer Alexandre Emile Jean Yersin. The name change became official in 1970. For convenience, in this article only the new name is used. Further, following common scientific convention, I spell out the genera and species of microorganisms the first time they are named, but shorten them thereafter; for example, *Yersinia pestis* is shortened to *Y. pestis*.
- <sup>2</sup> B.L. Ligon, "Plague: A Review of Its History and Potential as a Biological Weapon," *Seminars in Pediatric Infectious Diseases* 17(3):161-170 (2006).
- <sup>3</sup> Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, 1972: <[http://www.unog.ch/80256EDD006B8954/\(httpAssets\)/C4048678A93B6934C1257188004848D0/\\$file/BWC-text-English.pdf](http://www.unog.ch/80256EDD006B8954/(httpAssets)/C4048678A93B6934C1257188004848D0/$file/BWC-text-English.pdf)>.
- <sup>4</sup> Weaponizing is the process of researching and developing a pathogen or toxin to the point where it becomes suitable for use in a weapons system.
- <sup>5</sup> Richard P. Strong, ed., *Report of the International Plague Conference Held at Mukden, April, 1911* (Manila, Philippines, 1912).
- <sup>6</sup> Mark Gamsa, "The Epidemic of Pneumonic Plague in Manchuria 1910-1911," *Past & Present* No. 190:147-183 (February 2006).

- <sup>7</sup> For a rather complete history of plague vaccine, see: Valentina A. Feodorova and Vladimir L. Motin, "Plague vaccines," in Valentina A. Feodorova and Vladimir L. Motin (eds.), *Vaccines Against Bacterial Biothreat Pathogens*, (Kerala, India: Research Signpost, 2011), pp. 175-233.
- <sup>8</sup> V.A. Feodorova and M.J. Corbel, "Prospects for New Plague Vaccines," *Expert Reviews of Vaccines* 8:1721-1738 (2009).
- <sup>9</sup> Haffkine Institute, "Bacteriology," no date: <<http://www.haffkineinstitute.org/bacteriology.htm>>.
- <sup>10</sup> Feodorova and Motin, p. 185.
- <sup>11</sup> B.N. Mishankin and N.V. Lopatina, "Problems and Prospects: Plague Vaccine, Past, Present, and Future" (in Russian), *Biotekhnologiya* No. 4:3-9 (April 1996).
- <sup>12</sup> George W. Christopher, et al., History of U.S. Military Contributions to the Study of Bacterial Zoonoses," *Military Medicine* 170:April Supplement 2005, p. 40.
- <sup>13</sup> Rexmond C. Cochrane, *History of the Chemical Warfare Service in World War II (1 July 1940 - 15 August 1945. Biological Warfare Research in the United States, Volume II*, Office of Chief of Chemical Corps, Camp Detrick, November 1947, p. 359. Secret. (Declassified September 18, 1975.)
- <sup>14</sup> K.F. Meyer, et al., "Plague Immunization. I. Past and Present Trends," *Journal of Infectious Diseases* 129 (Supplement 1):S13-S18 (1974).
- <sup>15</sup> Epidemiolog.ru, "Plague Vaccine Live Dry (Vaccine Plague), *Catalogue of Vaccines Registered in Russia* (in Russian); [http://www.epidemiolog.ru/catalog\\_vac/?SECTION\\_ID=&ELEMENT\\_ID=476](http://www.epidemiolog.ru/catalog_vac/?SECTION_ID=&ELEMENT_ID=476).
- <sup>16</sup> V.A. Lebedinsky, T.G. Abdullin, V.I. Yevstigneev, N.S. Garin, and Ye.P. Lukin, "Contribution Made by the Scientific Research Institute of Microbiology of the USSR Ministry of Defence to Research Into the Problems of Infective Immunology" (in Russian), *Voenna-Meditsinskiy Zhurnal* 8:67-71 (1989).
- <sup>17</sup> Work to improve the plague vaccine continued after the war. A team led by two military scientists, V.A. Lebedinsky and V.I. Ogarkov, are said to have developed a small-particle aerosol form of the dry EV vaccine that was administered by inhalation and showed marked

- advantage over all other vaccines in preventing pulmonary plague (see N. I. Nikolayev, "History of Development of Plague prevention in the USSR" (in Russian), *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii*, no. 4:110-115 (1979).
- <sup>18</sup> NIEG is the acronym for Scientific Research Institute for Microbiology of the Russian Federation Ministry of Defense in Kirov city, which was the first in the USSR to develop a LWC plague vaccine.
- <sup>19</sup> Feodorova and Motin, pp. 187-193.
- <sup>20</sup> Jack D. Poland and D.T. Dennis, "Treatment of Plague," in the World Health Organization's *Plague Manual Epidemiology, Distribution, Surveillance and Control*, WHO/CDS/CSR/EDC/99.2, 1999, pp. 55-61; <http://www.who.int/csr/resources/publications/plague/whocdscsredc992b.pdf>.
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- <sup>25</sup> Ibid, p. 12.
- <sup>26</sup> ID<sub>50</sub> is the number of microorganisms required to infect 50% of exposed individuals.
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- <sup>28</sup> Ibid, p. 7.
- <sup>29</sup> Ibid.
- <sup>30</sup> Arvo T. Thompson, *Report on Japanese Biological Warfare (BW) Activities*, Army Service Forces, Camp Detrick, May 31, 1946, p. 15. Secret. (Declassified September 10, 1970.)
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- <sup>33</sup> Anonymous, *History of Plague Epidemics in China*, Institute of Epidemiology and Microbiology, (Peking: Chinese Academy of Preventive Medicine, 1964).
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- <sup>35</sup> Thompson, 1946, Supplement 4G.
- <sup>36</sup> Biological Section, Experimental Station, Porton, "Bacteriological Warfare: Evidence of the Interest of Other Countries in Bacteriological Warfare," Porton Down, April 14, 1943, Most Secret, (Document Unclassified JCP-1,DPG, no date), pp. 5-7.
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- <sup>38</sup> Sherman Miles, Acting Assistant Chief of Staff, G-2, "Memorandum for the Chief of Staff: Subject: Recent Developments in the Far East," November 27, 1941, Page 1368, section 13; <[http://www.ibiblio.org/pha/pha/pt\\_14/x14-033.html](http://www.ibiblio.org/pha/pha/pt_14/x14-033.html)>.
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- <sup>60</sup> Some scholars refer to it as the 15<sup>th</sup> Directorate for Biological Protection of the General Staff. It also was known as P.O. Box A-1968. See Gulbarshyn Bozheyeva, Yerlan Kunakbayev, & Dastan Yeleukenov, *Former Soviet Biological Weapons Facilities in Kazakhstan: Past, Present and Future*, CNS Occasional Paper No. 1 (Monterey, California: Center for Nonproliferation Studies, 1999).
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- <sup>62</sup> Also translated as the Inter-Agency Scientific and Technical Council (Alibek with Handelman, p. 43).
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- <sup>64</sup> Like other civilian scientists who were to work for Biopreparat, Zhdanov concealed his

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- <sup>71</sup> Each *Y. pestis* cell is surrounded by a capsule that is comprised of the Fraction 1 (F1) protein. F1 is only fully expressed at 37° C, which is the normal human body temperature. Thus, when *Y. pestis* invades the human host and is exposed to its 37° C environment, it mobilizes F1 whose major effect is to protect the pathogen from phagocytosis (ingestion by white blood cells).
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- <sup>74</sup> Popov, 2007.
- <sup>75</sup> For more complete descriptions of USSR's biological weapons, see Leitenberg and Zilinskas, pp. 298-303.
- <sup>76</sup> Venturi effect – as the aircraft moves through air, wind blows over the top of the container thus reducing the air pressure at its top which results in the dry or wet formulations it contains being drawn out. The formulation is then dispersed by the aircraft's slipstream.
- <sup>77</sup> Leitenberg and Zilinskas, p. 299.
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- <sup>84</sup> The four pathogens and one toxin are *Bacillus anthracis*, *Francisella tularensis*, *variola major virus*, *viral hemorrhagic fever viruses*, and *botulinum neurotoxin*.
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- <sup>89</sup> Ken Coleman and Raymond A. Zilinskas, "Fake Botox, Real Threat," *Scientific American* 302(6):84-89 (June 2010); <<http://www.scientificamerican.com/article.cfm?id=fake-botox-real-threat>>.
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## Preparing for the 4<sup>th</sup> Review Conference of the Chemical Weapons Convention: Some Observations on Process and Outcomes

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### Summary

The 4<sup>th</sup> Review Conference to the 1993 Chemical Weapons Convention (CWC) will be held in 2018. The Member States will, in light of the recent experiences in Iraq and Syria and in accordance with the regime's seven core objectives, continue to clarify the focus and balance of activities going forward.

The Fourth Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (4<sup>th</sup> CWC Review Conference) will be held in 2018. A rebalancing of the resources and focus of the Organisation for the Prohibition of Chemical Weapons (OPCW), the body that implements the 1993 Chemical Weapons Convention (CWC), is occurring. The OPCW has a staff authorization of circa 459 (currently about 420) and its 2017 Programme and Budget totals €67,798,200 of which €29,129,200 are earmarked for verification-related costs. The financial allocations in the Annual Programme and Budget reflect the fact that most stockpiled chemical weapons (CW) have been destroyed. Currently approximately 95 per cent of declared CW stockpiles have been verifiably destroyed and four states remain outside the treaty regime (Egypt, Israel, North Korea and South Sudan). The rebalancing is also reflected in planning processes carried out in accordance with Results-Based Management (RBM) principles and objectives and are reflected in the OPCW's Medium Term Plan (MTP).

The OPCW's verification capacity and experience remain relevant in view of recent confirmed cases of CW use in Iraq and Syria, and the investigation of the assassination of Kim Jong-nam (Kim Jong-un's older half-brother) reportedly with VX at the Kuala Lumpur International Airport 2 (KLIA2) on 13 February 2017. The use of sarin on 4 April 2017 in Khan Shaykhun (Idlib governate) and the 6 April retaliatory US Tomahawk cruise missile strikes against the Shayrat Airfield have raised political tensions among governments at the UN Security Council, the OPCW Executive Council (EC) and elsewhere.

Some have argued that, given the repeated CW use in Syria, the taboo against chemical warfare is weakening.<sup>1</sup> Others maintain that while having zero tolerance for CW use is to be preferred as an ideal, its continued use in the armed conflicts in Iraq and Syria does not fundamentally alter international, including customary, law. Also states and civil society do not openly advocate or accept the development, stockpiling or use of such weapons.

Some observers also question why the OPCW does not publicly act in cases of non-official allegations of 'chemical weapons' use.<sup>2</sup> Some of the allegations are not sufficiently technically grounded. There can be confusion over the significance of fumes on the battlefield. There can also be uncertainty as to whether white phosphorus is prohibited. If used as a tracer round it is not. Also states (not members of the public) must bring such matters forward through, for example, the EC. Having said this, the specific circumstances connected to such allegations can (and should) be further clarified publicly in an authoritative manner.

The OPCW's annual Programme and Budget is structured according to seven 'core objectives' (formerly 4 'pillars'): (a), chemical demilitarisation, (b) non-proliferation/non-re-emergence of chemical weapons, (c) assistance and protection, (d) international cooperation, (e) universality, (f) national implementation, and (g) organizational effectiveness. These objectives inform policy formation, including preparations for the 4th CWC Review Conference.

### **Chemical demilitarisation**

Since the CWC entered-into-force (EIF) in April 1997 the Member States have focused on verifying the destruction of CW stockpiles

and associated infrastructure. At EIF CWC more than 85 per cent of the OPCW's resources were devoted to routine declarations and verification of CW facilities, as well as of the chemical industry. This amount has since dropped to below half of the nominal annual Programmes and Budgets.<sup>3</sup>

Member States and interested observers have also considered whether Russia and the United States (the two major possessor states) would meet the final extended deadlines in April 2012 and what the penalties should be for their failing to do so. The EC consequently sends special delegations to visit facilities in the two countries annually to underline the political significance attached to the matter by the Member States. Russia and the United States have also provided additional reporting on their efforts to the Conference of the States Parties (CSP) and EC.<sup>4</sup> The United States will complete its destruction operations by 2025/2030, while Russia expects to complete its operations within the coming months.

Old and/or abandoned chemical weapons (OACW) will continue to be recovered for some years, if not decades.<sup>5</sup> Work has also been carried out to develop technologies and to conduct evaluations on the environmental effects of sea-dumped CW, principally the possible effects of arsenic (e.g., from Lewisite) and sulphur mustard (H, HD) hydrolysis products. The Secretariat has followed OACW developments, including by sending representatives to the annual UK Dstl-organised Chemical Weapons Destruction (CWD) conferences, and, in principle, following the results of information survey work conducted under the auspices of the UN Secretary-General (in accordance with a 2010 Second Committee decision).<sup>6</sup> The Secretariat has also provided informal technical advice to some Member States

concerning the occasional recovery of OACW items. Private sector interest and environmental concerns may prompt the Member States to modify the role of the OPCW on sea-dumped-related matters.<sup>7</sup>

### **Nonproliferation/Non-re-emergence of chemical weapons**

Shifts in the priorities of the Member States may be reflected by changes in terminology. During the 1993-1997 Preparatory Commission (PrepCom) and for the period immediately following EIF CWC, the term 'nonproliferation' was avoided and—with the exception of some national papers and statements—discussion of terrorism was largely absent in OPCW documentation. The term nonproliferation began to appear in OPCW documentation with some regularity during the tenure of the second Director-General (DG) Ambassador Rogelio Pflinter of Argentina. Under the OPCW's third and current DG, Ambassador Ahmet Üzümcü of Turkey, the term has become standard, although some Member States continue to view its use as indicative of a mainly Western-driven agenda that seeks to implement global strategic trade controls to the possible detriment of International Cooperation and Assistance (ICA) activities (Article XI). As such 'non-re-emergence of chemical weapons' is also used.

The Member States traditionally took the view that non-state actor threats were largely an internal matter that should be addressed by the full implementation of the relevant CWC provisions ensuring that all legal persons under a State Party's jurisdiction and control are held legally accountable for any acts of chemical warfare. The Member States have since adopted a more pluri-lateral framework/consultative approach to such threats. The OPCW has, since 2001, contributed to The Open-Ended Working Group on Terrorism (OEWG-T)

and, more recently a sub-working group on non-state actor threats. Secretariat and 1540 Committee officials have also interacted since the UN Security Council passed Resolution 1540 in 2004.

The OPCW has also been a member of the UN Counter-Terrorism Implementation Task Force (CTITF) since it was established in 2005. In 2011 the Secretariat helped to prepare a report within the CTITF framework on interagency coordination in the event of a chemical and/or biological terrorist attack. In addition, the 2016 12-month extension of the OPCW-UN Joint Investigative Mechanism (JIM) in Syria carries a greater emphasis to investigate suspected cases of CW use by terrorist groups.

It should also be noted that the OPCW Laboratory has conducted work on computational approaches to the study of sulphur mustard (H, HD), including through the identification of two main impurities that are associated with using the Levinstein [production] Process and their degradation/reaction products in the environment. These findings have been compared against samples taken from Iraq and Syria for the purposes of attribution of responsibility for CW attacks. This work has contributed to the confirmation of the use of sulphur mustard in the Kurdistan Region of Iraq.<sup>8</sup> Further authoritative literature on alleged chemical weapons comprises cohort studies such as family members exposed to sulphur mustard from an artillery shell attack in August 2015 in Marea, Syria.<sup>9</sup>

### **Assistance and protection**

The OPCW has advised and supported Iraq on sampling and analysis related to the self-described Islamic State (IS) in the context of recent and ongoing combat operations, as well as the verified destruction of items

leftover from the period of Saddam Hussein at the al-Muthanna Complex. In 2016 the OPCW established the Rapid Response Assistance Mission (RRAM) to help address such requirements.

Strengthening chemical security through the relevant articles of the CWC remains a priority for the Member States which, in turn, is reflected in various planning documentation such as the MTP. In March 2017 the Secretariat circulated to the Member States a survey on needs assessment and compilation of tools, guidance, and best practices on chemical safety and security management in partial fulfillment of a decision by the 16th CSP to identify and agree a framework for the full implementation of Article XI.<sup>10</sup>

In practice, chemical safety and security concepts are inter-linked. Within a CWC context, it is important to clarify and maintain appropriate distinctions with respect to linkages (actual and potential) between chemical safety and security on the one hand and the full implementation of Article XI on the other hand. The Member States may possess differing understandings on the appropriateness of linking some (or all) chemical security measures and concepts with Article XI. Such considerations can be addressed partly by focusing on operational or technical aspects of chemical security in particular.

### **International cooperation**

In the years following EIF of the CWC the African Group supported the opening of an OPCW office in the region partly with a view towards strengthening Article XI implementation on economic and technological development. This proposal was not supported by some other Member States on the grounds that to do so would suggest a need to open similar offices in other

geographic regions based on the CWC-defined geographic groupings. Such a development would have financial and other implications for the treaty regime. Many of the OPCW capacity-building and outreach meetings have nevertheless been held in Africa.

The OPCW maritime removal operations of chemicals from Syria (2013-2014) and Libya (2016) demonstrate an increased use of operational planning groups (OPGs) or equivalent that coordinate verification and destruction-related activities. For example, the donor architecture of the 2016 Libyan chemicals removal operation (OPRECLIB) cost approximately \$(USD)7 million and included financial and in-kind contributions from inter alia Canada, Denmark, Finland, France, Germany, Italy, Malta, Spain, the UK and the United States. In addition, the United Nations Office for Project Services (UNOPS), private sector actors and others contributed to these efforts.

There are limits to which the published literature can address international assistance—particularly ICA activities such as the Associate Programme—and organisational effectiveness (which is more in the realm of management theory as it relates to the UN) (please see below).

### **Universality**

Although the CWC's membership is nearly universal, two or three states may remain outside the treaty over at least the medium term. North Korea has continued the practice of not acknowledging letters by OPCW DGs and outreach efforts by other officials requesting dialogue on possible CWC accession.

An enormous literature, mainly in the nuclear weapons/Non-proliferation Treaty (NPT) context, has been developed on achieving a WMD Free Zone in the Middle

East (WMD-FZ ME).<sup>11</sup> Iran maintains a long-held position of not wishing to engage in direct talks with Israel. Israel maintains that its participation in multilateral disarmament and arms control regimes concerning nuclear, biological and/or chemical (NBC) weapons and their delivery systems cannot practically occur until the region's broader peace and security concerns are sufficiently addressed.

Iran is an original party to the CWC and was one of the more active delegations during the PrepCom. Iran has generally interpreted 'managed access' verification questions fairly narrowly (e.g., by opposing some proposed changes to the content of and procedures for utilising the OPCW Central Analytical Database (OCAD) during inspections). As a signatory to the CWC, Israel actively participated at the PrepCom, including on the development of 'managed access' verification procedures, such as the development of blinding software to give a yes/no response for gas chromatography/mass spectrometry (GC/MS) readings. Israel has also attended OPCW CSPs as an observer for some years and has interacted with OPCW officials and facilitators tasked with promoting universal treaty membership.

Many Middle East and North African (MENA) states have maintained that Israel must first accede to the NPT prior to their joining the CWC.<sup>12</sup> This position began to break down with the accession of Libya to the CWC in 2004, followed by the accession of Iraq (2009), Lebanon (2008) and Syria (2013). The current and previous OPCW DGs have publicly questioned whether any state should maintain the view that it might engage in chemical warfare.

The case for a stepwise approach for states in the region to accede to the CWC has been recently revisited<sup>13</sup> Proposals have included confidence-building measures (CBMs)

combined with track 1.5/2 processes, such as in the fields of counter-terrorism, and chemical and biological safety and security. Some processes and other engagement are desirable and necessary.

However, any decision to join the multilateral NBC disarmament and arms control regimes partly depends on whether actors in the region agree or, in effect, accept delinking some of the WMD-FZ ME policy positions and, perhaps, establishing new or revised political linkages. Politically-motivated challenge inspections (CI) of Israel must be avoided. CWC managed access provisions should also be respected—not abused—by both the host country and the CWC Member States collectively. This includes cases where other sensitive security and defence activities are co-located at, or are adjacent to, inspection sites. Reductionist disagreements in the Syria context should also be avoided (or at least mitigated) by the Member States by keeping separate technical and political matters and by attempting to adhere to longer-term perspectives.

## **National implementation**

The Member States undertake to adopt the necessary measures to implement their CWC obligations (Article VII). Progress in this area, while much improved, was uneven in the period immediately following EIF CWC. The OPCW therefore developed a national legislation implementation kit (available on its website) and implemented several action plans with European Union (EU) support. The Secretariat regularly updates the Member States on the status of these efforts, including at the annual CSPs. Currently 188 National Authorities (NAs) have been established, 118 States Parties (SPs) have legislation in place to implement and fulfill their obligations under Article VII,<sup>14</sup> and 149 SPs have informed the OPCW of the

legislative and administrative measures they have taken to implement the CWC.

Institutional and political fractures are currently worsening over how to handle Syria—a CWC party since 2013. At a special EC meeting in April 2017 some Member States used pointed language in stating that Syria is in fundamental non-compliance with its CWC obligations and withheld chemical weapons. At least two SPs maintained that opposition forces in Syria are responsible for the sarin casualties of 4 April. At least one SP expressed regret that the United States chose to carry out the missile strike in lieu of pursuing CWC investigation of alleged use (IAU) provisions. Several SPs also supported proposals tabled at the UN, the OPCW and elsewhere that a further international technical investigation body—in addition to the JIM and the OPCW Declaration Assessment Team (DAT) and the OPCW Fact-Finding Mission (FFM)—be established to assess the 4 April incident. Other SPs argued that to do so would be superfluous to the mandates of the existing international bodies' work and would further complicate international efforts to agree attribution of responsibility for the 4 April attack and other cases. On 20 April the reconvened special EC meeting voted down (6 in favour, 21 against, 13 abstentions) a draft decision tabled by Iran and Russia to establish such a technical investigative body.<sup>15</sup> On 5 May 2017 the FFM issued its latest public report concerning the confirmed presence of sulphur mustard related to a 16 September 2016 incident reported by Syria at Um-Housh. This finding is based on an examination of samples and material evidence handed to the FFM in the presence of official representatives of the Russian military.<sup>16</sup>

### **Organizational effectiveness**

There has been an increased acceptance by the Member States to submit declarations

digitally (via the Electronic Declarations Tool for National Authorities, EDNA). Following EIF CWC essentially all the Member States' declarations were submitted in paper format. Digitisation (and making searchable) the Member States' declarations and inspection reports is ongoing and should result in a streamlining of verification procedures and analysis.

A further trend is the incorporation by the OPCW of private-sector management approaches, including ensuring staff turnover. This was initially done through the adoption of results-based-budgeting (RBB) and the adoption of a 7-year tenure policy. Today this is reflected in the issuance of MTPs, the implementation of enterprise-resource-planning (ERP)—including through the development of an information-services strategic plan, and the use of *SMARTStream* software to implement ERP. The OPCW has allocated €782,500 to ERP under the 2017 Programme and Budget. The structure of RBB further evolved in 2011 under the rubric of RBM. The annual Programmes and Budgets are structured accordingly.

### **Structuring Review Conferences**

Review Conference planning typically follows standard procedures and templates. Some of the outcomes are process-oriented, while other outcomes meet the standard definition of a 'decision' (some 'decisions' taken within multilateral disarmament and arms control treaty regimes are actually process-oriented, or are statements of concern or political commitment).

Expertise associated with implementing the CWC include: arms control verification, chemistry, convergences between chemistry and the life sciences, decontamination methods and strategies, engineering, history, industrial process design and control, intelligence methods, international relations,

law, medicine, and particulate modeling. It can be difficult for non-specialists to judge competing narratives of ongoing (suspected and confirmed) cases of CW use in Iraq and Syria. Partly for this reason, it is useful for the OPCW to have some personnel who combine a scientific and technical background with operational expertise in the security and defence sector. This can include those familiar with munitions development, testing and/or disposal, or those familiar with how dual-purpose technology, equipment and items might be used for prohibited purposes. The majority of OPCW policy positions are held by former diplomats or individuals with diplomatic experience (e.g., within the UN system). As such, they are experienced in the sending and receiving of political signals and the drafting of documentation that can attract consensus support.

As a matter of general principle, the Member States undertake to improve the effectiveness of strengthened review processes. This typically includes: (a) clarification or confirmation of the purposes of the Review Conference, Preparatory Committee, Committee of the Whole (CoW) and Open-ended Working Group (OEWG), respectively; and (b) agreeing agendas, dates, institutional contacts, officer appointments, programmes of work, reporting mechanisms, rules-of-procedure, timetables, and venues.

Facilitators (or similar) should ideally develop a good sense of the 'landscape' of political cross-linkages. They should understand when (and how) to limit discussions when they risk creating unhelpful complications. Such officials should also ideally maintain a good sense of the significance and nature of documentation flows so that the relevant information goes where it is needed in a timely manner and is

retained (as appropriate) for future reference.

Review Conferences traditionally evaluate the implementation of the regime article-by-article. The Member States reaffirm their political commitment to the regime and its legal norms. The Review Conference should also ideally put in place or strengthen mechanisms for consultations and clarification in order to maintain and strengthen implementation practice both politically and operationally.

On 14 July 2016 the EC established an Open-Ended Working Group on the Future Priorities of the OPCW (OEWG-FP).<sup>17</sup> This body is to serve as 'an informal mechanism for receiving, discussing, prioritising, elaborating, and integrating ideas and proposals' from the Member States and the Secretariat on future OPCW priorities concerning 'any aspect of the Convention or developments relevant to it with a view to supplying a holistic, coherent, forward-looking, and action-oriented document'. The group is also tasked to generate recommendations for the 4th CWC Review Conference as 'a contribution to the full, effective, and non-discriminatory implementation of all [of the] provisions of the Convention'.<sup>18</sup>

The first CWC Review Conference, chaired by Ambassador Nourreddine Djoudi of Algeria, was convened in 2003 in the wake of the ouster of Ambassador José Bustani of Brazil as DG the previous year. This Review Conference was structured as an article-by-article review combined with thematic elements. The OPCW was experiencing budgetary pressures partly due to an inability to transfer funds leftover from the end of a given calendar year into the next, non-payment (or late payment) of annual contributions, and the absence of a working

capital fund (WCF) to smooth expenditures. Full and effective implementation of the CWC (i.e., fulfilling the key provisions of Article VII), as well as achieving universal membership, were major priorities. The OPCW was transitioning to a 7-year tenure policy for most staff.<sup>19</sup> This Review Conference was planned and implemented by many who had participated in the PrepCom. Substantial attention was devoted to riot control agents (RCAs) and Non-Lethal Weapons (NLWs) at a side event held at The Hague Peace Palace. The importance of maintaining readiness to conduct CIs was also given some prominence in view of the uncertainty among the Member States as to whether one would actually be triggered.

The Second CWC Review Conference was held in 2008. Ambassador Lyn Parker of the UK chaired the OEWG, while Ambassador Benchaâ Dani of Algeria chaired the CoW which both first met in July 2006. The Chair of the Review Conference was Ambassador Waleed El Khereiiji of Saudi Arabia. Several facilitators, each of whom held responsibility for specific areas (e.g., general obligations, functioning of the organisation, national implementation, Article VI), assisted consultations among the delegations and kept the DG apprised of developments. The CoW found itself in increasingly protracted discussions and developing a draft report with a growing number of brackets (the 'Parker text'). This text was reviewed by approximately 21 member states who met in parallel. Once the 'other group's' draft document was circulated to the general conference, it became evident to many delegations that they had not been fully consulted. Many of those involved considered this exercise to be necessary in order to achieve a successful outcome within the CSP's timeframe. Issues of some prominence included full and effective implementation of Article XI (including a recurring proposal by the African Group to establish a regional

OPCW office in Africa), and a consideration of what the consequences should be for Member States not meeting their CW destruction deadlines. The OPCW introduced RBB in 2004 and RBB principles and objectives were reflected in the outcomes of this Review Conference.

In preparing for the Third CWC Review Conference in 2013, the DG used the 2011 report prepared by the Advisory Panel on Future OPCW Priorities (prepared under the chairmanship of Ambassador Rolf Ekéus of Sweden) as a basis for consultations with delegations.<sup>20</sup> Chemical industry verification issues had, by this time, been addressed to a significant extent. SPs not meeting CW destruction deadlines had become less of a concern among the members. The Ekéus Report also influenced the development of longer term OPCW strategy development, including the MTP.

### **Looking ahead**

The OPCW's cooperation and outreach activities have substantially expanded under the current DG. In 2016 the Advisory Board on Education and Outreach (ABEO) was established. Its work is partly informed by reports by 'coordination groups' in at least nine areas which, in turn, provide a useful basis for structuring goals and actions to promote the OPCW's relevance and visibility.<sup>21</sup> While ABEO activities should have an element of comprehensiveness in approach, the outcomes must also possess relevance (actual and perceived) and interest among stakeholders. Private sector activities and planning strategies (including integration of sub-strategies) and associated documentation may offer a useful basis for ensuring that the ABEO (in particular) and OPCW (more broadly) can maintain systematic engagement with all relevant stakeholders, while achieving operationally-relevant goals.

Training and outreach seminars with customs and licensing officials are now well-established. The OPCW continues to adopt elements of organizational structuring and policy objectives that are derived from the private sector such as ERP, RBM and a knowledge management programme designed to retain institutional memory and expertise. The Member States have generally adopted digital reporting (e.g., through the use of EDNA). The OPCW also has well-established operational experience resulting from its work in Iraq, Syria and Libya. This includes using private contractors for drafting elements of destruction plans, coordinating the provision of destruction assistance by the Member states, and cooperating with UNOPS, the World Health Organization (WHO), the World Customs Organization (WCO), Interpol and the United Nations Office for Disarmament Affairs (UNODA).

As previously mentioned, the OEWG-FP is mandated to look at future OPCW priorities. It is not expressly tasked to organize the Fourth CWC Review Conference (although the EC may modify the group's mandate to do so if it so wishes). Should the Member States so decide, the Secretariat can function as the principal planning and organizing body for the Review Conference. It is unclear who (institutionally or individually) is working to obtain a better understanding of the structural and planning elements of the Review Conference among the Member States. This includes attempting to identify possible political cross-linkages, especially with respect to Syria's treaty status.

In previous Review Conferences a limited number of delegations have undertaken such 'mapping' exercises. It might be useful for the OPCW to designate one or more Review Conference facilitators to ensure that Syria-related matters are well-managed and do not detract from achieving successful Review

Conference outcomes in other CWC implementation areas. It should also be noted that the terms of reference for the OEWG-FP make clear that while informal consultation processes are part of normal practice, there must not be an 'in-group' and 'outer-group' of 'most interested parties' and 'interested parties' in the lead up to and holding of the 4th CWC Review Conference.

The default position of the Member States for the routine declaration and verification system remains to limit the cost, scope and level of intrusiveness to that deemed to be sufficient for effective CWC implementation. This position might be modified somewhat in light of Syria-related developments.

There is continued concern of an effective 'backdoor' developing to the legal prohibition against chemical warfare (i.e., riot control agents (RCAs), non-lethal weapons (NLWs), less-than-lethal weapons, incapacitants, and central nervous system (CNS)-acting chemicals). Switzerland deserves great credit for moving the discussion on CNS-acting chemicals forward, including at the 2016 CSP and into 2017.

There is further scope to support the capacities of the newly-established RRAM teams, remote monitoring capacities (e.g., through the use of the secure information exchange (SIX) system based on the experience of the 2016 Libyan maritime chemicals removal operation to Germany), and the various verification-related work streams of the OPCW's Scientific Advisory Board (SAB) (e.g., best practices for sample stability, biomedical sample analysis, and the handling of chemicals that have parent structures listed in the CWC's Annex on Chemicals but which are altered via isotopic labeling or by isolating a unique stereoisomer). Medical pathology video and questionnaire best practices may also have verification relevance in the further

assessment of evidence of CW use in Syria and (possibly) Iraq.

The process of identifying and electing a new DG has already begun. This process presents new opportunities for cross-linking political positions within (and outside) the CWC regime. This work will reflect a political calculus for achieving equitable geographic balance among the 4th CWC Review Conference officers and similar changes in the top Secretariat management (which, in turn, must also reflect an appropriate geographic balance). Such processes should be characterized by appropriate discretion and proper consultations, as well as being carried out in a spirit of good will, including with regard to achieving successful 4th CWC Review Conference outcomes.

#### 4th CWC Review Conference principles:

-observe the principles of transparency and inclusiveness when implementing consensus-driven processes, while avoiding loss of control and focus by Review Conference officers/facilitators (or equivalent).

-support the development of a longer-term balanced programme of work and associated capacities vis-à-vis relevant vision(s) for the treaty regime.

-examine options for retaining specialised expertise at OPCW (irrespective, initially, of their potential implications for geographic balance).

#### Longer-term activities

-analytical support for sample taking and forensics analysis.

-chemical safety and security best practices and training.

-logistics support, including contingency operations by ad hoc operational planning groups.

-further develop and agree key performance indicators based on RBM objectives and principles to better focus concepts of 'international outreach', 'capacity-building' and similar.

-identify potential measures to integrate the work of the ABEO with that of other OPCW bodies.

-review social media platforms and information exchange apps used in industry, research and training sectors for possible adoption by the OPCW.

-review current practices by national academies of science to promote peaceful uses of chemistry and their potential relevance for assessing and structuring ICA programmes and activities.

-review technology absorption indicator systems (e.g., by the Organisation for Economic Co-operation and Development, OECD) and their potential relevance for assessing and structuring ICA programmes and activities.

-develop case studies involving inter-and intra-regional cooperation on chemical security.

-map chemical security certification frameworks and practices.

-review state-of-the-art autonomous and semi-autonomous platforms for chemical security (e.g., the use of UAVs for chemical facility security and safety monitoring).

-incorporate, as appropriate, autonomous and semi-autonomous platforms into approved inspection equipment list for use in investigations of alleged use (IAU), and/or routine/non-routine inspections.

-consider the RRAM capabilities/model for counter-terrorist scenarios.

## Conclusions

The balance and focus of the CWC regime are changing. At least two visions may be realized: one of an OPCW focused on CW threats with most resources allocated accordingly; the other for the OPCW to serve as a model of international outreach and capacity-building for the peaceful uses of chemistry.

It is important that the Secretariat remains focused on technical matters, while the political matters (including preferred interpretations and outcomes) are dealt with by the CWC Member States. Finally, the Member States will, in accordance with the seven core objectives, continue to clarify the focus and balance of OPCW activities going forward.

\*The views expressed are the author's and do not necessarily reflect those of the Stockholm International Peace Research Institute (SIPRI).

## Endnotes:

- <sup>1</sup> E.g., Bentley, M., 'Strategic taboos: chemical weapons and US foreign policy', *International Affairs*, vol. 90, no. 5 (2014), pp. 1033-1048.
- <sup>2</sup> E.g., whether the use of white phosphorus in the Gaza Strip by Israeli security personnel as part of Operation Cast Lead in 2008-2009 constituted chemical warfare.
- <sup>3</sup> It should also be noted that destruction and removal operations involving Libyan and Syrian chemical weapons have been offset by special assistance funds and in-kind contributions by many of the Member States.
- <sup>4</sup> Only Iran has clearly objected to the US (only) not meeting its final CW destruction deadline which, in turn, were drafted by the CWC negotiators based on political, rather than technical, considerations.
- <sup>5</sup> See CWC, article II, paras. 5-6.
- <sup>6</sup> A/C.2/65/L.32/Rev.1 (24 Nov. 2010).

- <sup>7</sup> CW dumped at sea prior to 1 Jan. 1985 need not be declared.
- <sup>8</sup> SAB-25/1\*, paras. 9.17-9.20 (31 Mar. 2017).
- <sup>9</sup> The immediate and longerterm effects of the single family exposed to the HD shell are documented by researchers at the Dept. of Medical CBRN Defence at the Saglik Bilimieri University (Ankara, Turkey), and Tarsus State Hospital (Mersin, Turkey). (Saglik Bilimieri University was transformed into a civilian university in late 2016 in reaction to the July 2016 coup attempt.) The researchers are S. Sezigen, K. Ivelik, R. K. Eyison, Z. Kuna, M. Ortatatli and L. Kenar. The baby died on 4 Sep. 2015 from severe respiratory failure and secondary bacterial infection due to bone marrow suppression.
- <sup>10</sup> S/1483/2017 (30 Mar. 2017); and RC-3/3\* (19 Apr. 2013).
- <sup>11</sup> The 2010 NPT Review Conference called for convening a conference for to be held in 2012 to be attended by all states of the ME in order to establish a zone free of nuclear weapons an all other weapons of mass destruction.
- <sup>12</sup> The term MENA is objectionable to some in the region. The author does not wish to imply he endorses the term.
- <sup>13</sup> E.g., Bar-Yaacov, N., 'Achieving universality of the Chemical Weapons Convention in the Middle East', *Survival*, vol. 57, no. 6 (2015), pp. 159-180.
- <sup>14</sup> S/1485/2017, p. 13.
- <sup>15</sup> EC-M-54/DEC/CRP/Rev.1, 19 Apr. 2017.
- <sup>16</sup> S/2017/400, 5 May 2017.
- <sup>17</sup> 'Decision, establishment of an Open-Ended Working Group on the Future Priorities of the OPCW', OPCW document EC-82/DEC.2, 14 July 2016.
- <sup>18</sup> 'Decision, establishment of an Open-Ended Working Group on the Future Priorities of the OPCW', OPCW document EC-82/DEC.2, 14 July 2016, para. 1, pp. 1-2.
- <sup>19</sup> The decision was taken in April 2003 and effectively implemented starting in 2012. The DG has flexibility to retain or to rehire a limited number of key staff on a limited basis.

<sup>20</sup> Note by the Director General, report of the Advisory Panel on Future Priorities of the Organisation for the Prohibition of Chemical Weapons', OPCW document S/951/2001, 25 July 2011, <[https://www.opcw.org/fileadmin/OPCW/PDF/Advisory\\_Group\\_report\\_s-951-2011\\_e\\_.pdf](https://www.opcw.org/fileadmin/OPCW/PDF/Advisory_Group_report_s-951-2011_e_.pdf)>.

<sup>21</sup> ABEO-3/1, 16 March 2017, para. 8.

## **‘Nerve Agents’: Potent Chemical Weapon for War, Terrorism and Assassinations!**

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### **Summary**

In 2017, there have been two unrelated events where nerve agent have been used. This calls for close examination as the nerve agents are banned but can still be easily manufactured and are potent.

Since the beginning of this year, we have witnessed two distinct chemical weapon events involving the use of the lethal nerve agents. In February, a North Korean national, Kim Jong Nam, was killed when nerve agent VX was smeared on his face at Kuala Lumpur airport terminal, Malaysia. Just a few months after this, in early April, nerve agent was used in Khan Sheikhoun town in the northwestern Idlib governorate in Syria killing and maiming over a hundred people, including children. The Khan Sheikhoun incident reminded us of the August 2013 chemical weapon attack in Ghouta that killed over a hundred people near Damascus, Syria’s capital. These two incidents, though unrelated, necessitates close examination as the potent nerve agent, a banned but easily manufactured chemical weapon, was used in both the cases despite international proscription. Although it is common knowledge now that toxic chemical agents like chlorine, mustard or nerve agents are extremely potent, invisible and indiscriminate use against population targets and successfully used in the past to accomplish specific military goals, its atrocious use for terrorism and assassination purposes warrants action against the perpetrators.

### **Agents of Fear and Death:**

Nerve agents are highly potent, colourless, odourless, tasteless chemicals which belong to organophosphorous insecticides category. Categorized as G series: Tabun (GA), Sarin (GB), Soman (GD); and V series (VX, VXII), these agents are known for their persistence and toxicity that make them suitable for weaponisation. The G series were discovered by the Germans as insecticides but sooner it was recognised as potential chemical warfare agents. Documented history of nerve agents

informs that the first nerve agent ever synthesised was Tabun in 1936, followed by Sarin in 1939 and Soman in 1944. The lesser known Cyclosarin (GF) was discovered in 1949. However, unlike G series of nerve agents, the lethal discovery of VX took place in the United Kingdom during the course of civil pesticide research before it went to the military laboratory for war related synthesis and development in both UK and US by November 1955.<sup>1</sup> Infamous for its high toxicity, the VX, for example, is about 2000 times as toxic as mustard gas by skin absorption and about 300 times as toxic through the lungs.<sup>2</sup> Studies anticipated that 5 milligram of VX, if used properly, can kill approximately 6 soldiers.<sup>3</sup> If exposed to higher dosages, the symptoms will progress more rapidly through difficulty in breathing, nausea, vomiting, involuntary defecation and urination, convulsions and finally death.<sup>4</sup> The V-agents, more toxic than the G-agents, act rapidly if inhaled and act much faster through the skin. The V-agents can be dispersed in aerosols as direct contact is hazardous, especially on exposed skin or as a persistent indirect hazard contaminating the soil vegetation and equipment. This is why VX, the most volatile Nerve agent, is stockpiled in the secret military arsenals for its military effectiveness. The liquid properties of most of these nerve agents make them suitable for weaponisation and can be delivered using mortar shells, missile warheads, landmines, grenades, etc., through both aerial or ground dispersal vehicles.

Throughout last century, development of nerve agents in secret arsenals by both States and non-State Actors and its lethal application in war and in peacetime, dominated non-proliferation discourse. The UK's Porton Down, USA's Edgewood and Rocky Mountain Arsenals, Iraq's Samarra chemical complex, among others, have carried out in-depth studies, development and weaponisation of nerve agents. The

Persian Gulf War in the 1980s, however, showed definite evidence of the use of nerve agents and other chemical weapons (e.g. mustard agents). The most notable was March 1988 Halbaja incident when the then Iraqi regime targeted this Kurdish town with mustard gas and a host of other nerve agents (cocktail of Tabun, Sarin and possibly VX) killing over 5000 people. As per one estimate, of those who were killed 75% were women and children. Those who survived this chemical weapon mayhem subsequently developed critical respiratory, visual and psychological problems for life.<sup>5</sup>

Unlike Halbaja incident, which was condemned as crime against humanity perpetrated by a State actor, Tokyo subway nerve gas incident in 1995 orchestrated by a Non State religious cult to spread death and fear can be categorised as an act of terrorism against civilians. However, before this actual event in Japan, couple of times in the past, nerve gas scare was spread by criminal minded individuals like Muharem Kurbegovic (better known as the Alphabet Bomber or Isaiak Rasim who headed a group called 'Aliens of America'), who attempted to spread panic and terror in the US in June and August 1974 threatening to use nerve agents.<sup>6</sup> However, the hollow threats and scaremongering using nerve agents turned out to be a reality when members of Aum Shinrikyo, a Japanese millennial movement led by its blind but charismatic cult leader Shoko Asahara, spent millions on weapons of mass production plant for nerve agent Sarin and other weapons to spread terror in Japan and beyond. The Tokyo incident in which the deadly nerve agent Sarin was released in the Tokyo subway system killed 12 people and injured scores of commuters.<sup>7</sup>

### **North Korean Connection**

After two decades of the 1995 Tokyo subway nerve gas incident, the horror associated with

the nerve agents returned once again in February 2017 with the death of Kim Jong Nam, the 45-year-old estranged half-brother of the North Korean Supreme leader and Chairman of the Workers' Party of Korea. Investigations into Kim Jong Nam's assassination have revealed few details so far, including that his death was due to exposure to the VX nerve agent and two women (one Vietnamese and an Indonesian) who smeared his face with the liquid have been charged with the murder. Samples taken from the skin and eyes were identified as VX (ethyl-S-2-Diisopropylaminoethyl methyl phosphonothiolate) in a preliminary analysis by the Centre for Chemical Weapons Analysis of the Chemistry Department of Malaysia.<sup>8</sup>

Although the North Korean regime has vehemently denied any involvement in the assassination, the needle of suspicion is still on North Korea. At present, Malaysian authorities are investigating the case, zeroing in on few North Korean nationals who are believed to be hiding in North Korea's embassy in Malaysia or who could have fled to Pyongyang.<sup>9</sup> Apparently, Malaysian police is also investigating to fathom how this banned substance VX was brought into the country and where it originated from.

The Democratic People's Republic of Korea is known to have launched an acquisition and domestic production program of chemical agents, including mustard and other nerve agents, in the late 1970s. Reports emanating from neighboring South Korea have estimated that North Korea's stockpile of chemical weapons agents ranged between 2,500 and 5,000 tons.<sup>10</sup> Worryingly, North Korea is not a member of the Chemical Weapon Convention (CWC) -- it has neither signed nor acceded to it.

The country has already received warning letters from the United Nations and the

OPCW for this assassination allegation using banned chemical weapon. These international bodies have also urged this reclusive Nation to join the CWC at the earliest and declare or renounce its clandestine weapons programs.

### **Syria again!**

The August 2013 Ghouta chemical weapon incident and few subsequent small scale chemical weapon events during Syrian civil War are still fresh in the minds of this generation, while another equally devastating chemical weapon attack took place on April 4, 2017 at Khan Sheikhoun, a town in the northwestern Syrian Governorate of Idlib. The nerve agent used in the attack killed nearly 90 people, many of whom were children. The Khan Sheikhoun attack sparked international outrage as it proved the widespread use of Chemical weapons in the ongoing War. Unlike in earlier occasions where Chlorine gas and sulphur mustard were used, the latest strike was aimed at inflicting massive physical damage and moral trepidation within the civilian population. Hospitals treating the victims and subsequent laboratory analysis of samples by the French, British and Turkish governments have confirmed the use of Sarin nerve agent.<sup>11</sup>

The OPCW has observed that there were at least 30 chemical weapon incidents reported in the second half of 2016, and 15 incidents in Syria since the beginning of 2017.<sup>12</sup> To note, Syria, which joined the CWC in 2013, is believed to have chemical warfare program and stockpiles of nerve agent Sarin for offensive purpose. The country also reportedly destroyed 67,098 metric tons of chemical agents since it joined the CWC. However, it is likely that the Basar al Assad regime might be withholding some chemical agents in the guise of agricultural or industrial research, jeopardising complete destruction

efforts by OPCW. While the allegations and ground evidences from Khan Sheikhoun are going against the Syrian government forces, there are few allegations against the warring rebel groups active in Syria as well. The Syrian government has denied its involvement in the toxic attack and in turn blamed rebel groups for the Khan Sheikhoun incident. This controversy will continue over the actual user of the chemical weapon in Syrian war theatre for times to come.

## Conclusion

International efforts to proscribe the use and development of chemical weapons reached a landmark in 2017 during the marking of the 20<sup>th</sup> anniversary of the Chemical Weapons Convention (CWC) and the founding of the OPCW, the organization that helps in implementation of global ban on CW, defining its use as a taboo under international law. Not long ago, in 2013, OPCW, the international anti-chemical weapon regime, received Noble Peace Prize for its efforts to eliminate chemical weapons and in 2015 it commemorated the 100<sup>th</sup> anniversary of the first chemical agents use during the first World War in Ypres (Belgium) and in Bolimow (Poland). As per official assessment, approximately 95 per cent of declared chemical weapon stockpiles have been eliminated so far under the supervision of OPCW over the last two decades.

The confusion and blame game would persist as long as UN mandated chemical inspectors review and examine the biomedical samples from victims and environmental samples from the epicenters before a stipulated time. The deteriorating Syrian war situation makes things difficult to ascertain the real perpetrator of ongoing chemical anarchy. OPCW's request to send a technical mission to both Khan Shaykhun and Al-Shayrat airbase in Syria to establish the facts behind the latest Nerve agent attack is still pending.

In this situation, the upcoming Eighty-Fifth Session of the Executive Council at OPCW which will be held from in July 2017 would be vital especially with regard to the recent widespread chemical weapons use in Syrian civil war and elsewhere (e.g Kuala Lumpur). These incidents have virtually questioned the effectiveness of the international regimes and underscored the urgency for a robust collective effort to bring the possessors or users of this insidious weapon agent to justice and complete destruction of remaining stockpiles.

## Endnotes:

- <sup>1</sup> Eric A. Croddy (eds), "Chemical and Biological weapons" (Vol.1), in *Weapons of Mass Destruction: An Encyclopaedia of Worldwide Policy, Technology and History*, ABC-CLIO, California, 2005, pp. 313-314.
- <sup>2</sup> Steven Rose, *CBW: Chemical and Biological Warfare*, George G.Harrap & Company Ltd., London, 1968, p. 24.
- <sup>3</sup> Jared Ledgard, *A Laboratory History of Chemical Warfare Agents* (Second Edition) 2006, p. 223.
- <sup>4</sup> World Health Organisation (WHO), *Health Aspects of Chemical and Biological Weapons*, WHO, Geneva, 1970, p. 30.
- <sup>5</sup> "On This Day-1988: Thousands die in Halabja gas attack", BBC Report, [http://news.bbc.co.uk/onthisday/hi/dates/stories/march/16/newsid\\_4304000/4304853.stm](http://news.bbc.co.uk/onthisday/hi/dates/stories/march/16/newsid_4304000/4304853.stm)
- <sup>6</sup> For detailed study on Alphabet Bomber, See, Jonathan B. Tucker (ed.), "Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons", MIT Press, 2000, pp.71-94.
- <sup>7</sup> "Aum members sentenced to death for subway attack", Japan Times, July 18, 2000.
- <sup>8</sup> Kim Jong Nam probe: Chemical weapon VX nerve agent used, Malaysia police say", Channel News Asia, February 24, 2017, <http://www.channelnewsasia.com/news/asiapacific/kim-jong-nam-probe-chemical-weapon-vx-nerve-agent-used-malaysia—7603406>

- <sup>9</sup> "4 suspects in Kim Jong Nam's murder 'back in Pyongyang', video surfaces online", Asian Correspondent, February 20, 2017, <https://asiancorrespondent.com/2017/02/4-suspects-kim-jong-nams-murder-back-pyongyang-video-surfaces-online/#BOEebtVoxWkOVjI8.99>
- <sup>10</sup> "North Korea: Chemical", NTI, December 2015, <http://www.nti.org/learn/countries/north-korea/chemical/>
- <sup>11</sup> Jean-Marc Ayrault, "Chemical Attack in Syria - National Evaluation," Defense Council Meeting, April 26, 2017, <http://www.diplomatie.gouv.fr/en/country-files/syria/events/article/chemical-attack-in-syria-national-evaluation-presented-by-jean-marc-ayrault>
- <sup>12</sup> "Chemical weapons used 45 times in Syria since mid-2016, says global watchdog", AFP/Hindustan Times. April 28, 2017, <http://www.hindustantimes.com/world-news/chemical-weapons-used-45-times-in-syria-since-mid-2016-says-global-watchdog/story-V025DmySZ7XxeaagYPuJNN.html>

## Indian Pugwash Society

**Kapil Patil**

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### Summary

This is a brief overview of the Indian Pugwash Society.

### Indian Pugwash Society

The Indian Pugwash Society is a New Delhi-based non-governmental institution devoted to the study, research and discussion as well as raising awareness on problems relating to Science and World Affairs.<sup>1</sup> Established in 1967 by eminent scientists such as Dr. Vikram Sarabhai, Dr. D.S. Kothari, Dr. S. Hussain Zaheer, and Dr. P.C. Mahalanobis, the Society follows the moving spirit of the Russell-Einstein Manifesto issued in July 1955.<sup>2</sup> Since its inception, the Society has been leading research and discussions on issues of general and complete disarmament, new scientific and technological developments that may have bearings on international security, and the application of science and technology for the development of Global South.<sup>3</sup> In recent years, the Society has been actively promoting studies, research, and outreach in the areas of nuclear non-proliferation, disarmament, and nuclear energy and published reports which are distributed to relevant educational institutions, libraries and members of the Society.<sup>4</sup>

The Indian Pugwash Society also has a resource-rich website for wider dissemination of information on its various activities.<sup>5</sup> The website is regularly updated with research articles, commentaries, and documentation in the form of parliamentary Q&A, treaty texts, speeches, event reports, etc. The website provides free online access to research articles and documents to users. The website also displays video recordings of the speeches made by dignitaries during various seminars and conferences. It offers a unique platform for young researchers to publish short commentaries and research articles. Running for almost a decade now, the website has attracted a significant

number of visitors from India and around the world.

## Endnotes:

- <sup>1</sup> Pugwash History, URL: <http://pugwashindia.org/PugwashHistory.aspx>
- <sup>2</sup> Russell-Einstein Manifesto was issued in London on July 09, 1955, See: [http://pugwashindia.org/Issue\\_Brief\\_Details.aspx?Nid=117](http://pugwashindia.org/Issue_Brief_Details.aspx?Nid=117). Following its declaration, a group of scientists from the East and the West formed a group which came to be known as Pugwash Movement (officially known as Pugwash Conferences on Science & World Affairs).
- <sup>3</sup> See, Prof. Udgaonkar and Pugwash Movement by Dr. P. G. Lavkare in Proceedings of National Conference on Science Education - Challenges of Quality 12, 13 Sept., 2007, URL: <http://www.hbcse.tifr.res.in/data/pdf/bmu/proceedings-of-conference.pdf>
- <sup>4</sup> Gupta A. & Kapur, K. D. (2012), Emerging Asian Nuclear Environment Implications for India, New Delhi: Lancer's Books, URL: <http://pugwashindia.org/NewsLetterDetails.aspx?Nid=63>.
- <sup>5</sup> Indian Pugwash Society, URL: <http://pugwashindia.org/Default.aspx>

# Chemical and Biological News

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## NATIONAL AND INTERNATIONAL DEVELOPMENTS

### April Nerve Gas Attack in Syria Appears to Be One in a Series

*By Anne Barnard, May 1, 2017*

Beirut, Lebanon — Last month's chemical weapons attack on a rebel-held Syrian town may have caught the world's — and President Trump's — attention, but it was not the only recent suspected use of a nerve agent by Syrian government forces.

On three other occasions in the months leading up to the attack on the town of Khan Sheikhoun, witnesses, doctors and human rights investigators say, government attacks left scores of people sickened with similar symptoms, like foaming at the mouth, shaking and paralysis — including two attacks in December, little noticed at the time, that killed at least 64 people.

New information about the additional attacks appears in a Human Rights Watch report released Monday, bolstering New York Times reporting on those episodes and placing Khan Sheikhoun in the context of wider evidence that the Syrian government continues to use chemical weapons despite its 2013 agreement to give them up.

Despite the missile strike Mr. Trump ordered on the Syrian military airfield he said was the source of the Khan Sheikhoun attack, Syrian forces are doubling down on tactics that constitute war crimes, including bombing hospitals and rescue and medical workers and using chemical weapons, according to the report and other witness accounts.

The Syrian government and its main ally, Russia, deny that it uses such tactics.

At a news conference held at United Nations headquarters in New York to release the report's findings, the executive director of Human Rights Watch, Kenneth Roth, ridiculed what he described as "preposterous" assertions by the Syrian and Russian governments denying responsibility.

Mr. Roth said it was time for them "to stop these transparently false diversionary claims and come clean."

He also said the pattern of attacks as described in the Human Rights Watch report amounted to "a level of culpability and horror that cries out for prosecution."

So far, Russia has used its Security Council veto to block investigations of war crimes in Syria in the International Criminal Court. But even without a Security Council referral to the court, an accountability mechanism created last year by the General Assembly can be used to look into the allegations. United Nations officials told reporters on Monday in New York and Geneva that the work could begin soon, and that member states have raised half of the required \$13 million initial budget.

Mr. Roth expressed impatience for the secretary general, António Guterres, to appoint a prosecutor, but Mr. Guterres's spokesman, Stephane Dujarric, said the process was underway, adding, "I don't think the secretary general is dragging his feet."

On Saturday, an attack on a headquarters of the White Helmets civil defense rescue group in the town of Kafr Zita killed eight of its members, the group and other witnesses

say. And medical organizations working in Syria have tallied 10 government attacks in April alone on hospitals and clinics in rebel-held areas, part of a pattern of hundreds of attacks on medical workers and facilities that United Nations investigators have described as war crimes.

Human Rights Watch corroborated claims of two suspected nerve gas attacks on Dec. 12 that initially went relatively unnoticed. This was in part because they took place when the world's attention was focused on the battle over Aleppo, and in part because of the difficulty of verifying information in the Islamic State-held areas where they occurred.

Medical organizations and social media accounts that day shared images of dead children bearing no visible wounds, as if sleeping, like those killed by a nerve agent in Khan Sheikhoun and in 2013 attacks near Damascus. But because people can be killed for sharing information online from Islamic State-controlled areas, it was difficult to verify them at the time.

Human Rights Watch said its investigators interviewed four residents by telephone and two medics through intermediaries. It said they gave consistent accounts of chemical weapons attacks in two villages in eastern Hama Province, amid clashes between government and Islamic State forces, that killed residents sheltering in caves and in their homes.

The report also provides new details about the Khan Sheikhoun attack, as well as about an intensifying series of recent government bombings and shelling illegally using chlorine gas, with barrels dropped from helicopters and, in a new method, with improvised ground-to-ground missiles.

In those cases, too, the findings coincide with accounts residents and witnesses gave to

The Times and with a Times analysis of public information online.

Human Rights Watch corroborated eight chlorine attacks this year, out of a larger number reported by residents. Possession of chlorine, unlike sarin, is not illegal under international law, but its use as a weapon is. The attacks took place in areas where government forces were clashing with rebel forces, near the cities of Damascus and Hama.

The intense battles around Hama led to three attacks, two believed to be with chlorine and one believed to be with a nerve agent, in the two weeks before the Khan Sheikhoun attack. All of them were in al-Lataminah, a town in Hama Province between Khan Sheikhoun and the front line.

On March 25, ordnance crashed through the roof of a clinic that, because of previous attacks, had been reinforced with a metal roof covered with earth. Yellowish gas smelling of bleach filled the facility, killing a doctor, Ali Darwish, as he performed surgery, as well as his patient and another person, according to the Human Rights Watch report and other witnesses. On April 3, munitions with a similar smell again hit the village, injuring at least a dozen.

On March 30, a bomb fell without the usual intense explosion — chemical weapons typically contain a smaller explosive charge, to disperse but not destroy the agent — injuring 169 people, many but not all of them believed to be combatants. They reported symptoms similar to those from a nerve agent, including pupils constricted to pinpoints.

In the Dec. 12 attacks, two villages, Jrouh and al-Salaliyah, were hit, Human Rights Watch said. It quoted a Jrouh resident who said he found his wife, three children, brother, brother's wife and brother's three

children dead in his basement. He said his neighbors, his uncle and the families of his uncle's two sons also died.

"Everyone within 100 meters died," he told the rights group. "There was no one left." He buried his family and fled, and was interviewed by Human Rights Watch after finding refuge outside Islamic State territory.

Human Rights Watch interviewed 32 residents of Khan Sheikhoun and reviewed available evidence, corroborating previous accounts that one bomb containing a chemical agent fell after a warplane passed over before 7 a.m. on April 4, followed by three or four explosive bombs dropped in a second bombing run.

It found that bomb fragments from the scene of the suspected chemical bomb matched those of a Soviet-made munition that delivers sarin, the KhAB-250.

Human Rights Watch said it found no evidence for the version of events provided by Russia: that government warplanes bombed a warehouse holding chemical agents stored by rebel groups. Corroborating reporting by The Times and The Guardian, it found that the only buildings near the small crater left by the suspected chemical bomb were abandoned, sustained no new damage, and were open to the air and could not have concealed a chemical weapons store.

[https://www.nytimes.com/2017/05/01/world/middleeast/april-nerve-gas-attack-syria.html?rref=collection%2Ftimestopic%2FBiological%20and%20Chemical%20Warfare&\\_r=0](https://www.nytimes.com/2017/05/01/world/middleeast/april-nerve-gas-attack-syria.html?rref=collection%2Ftimestopic%2FBiological%20and%20Chemical%20Warfare&_r=0)

## **Assad kills at least 85 with chemical weapons**

*A dictator defies the world*, Apr 8th 2017 | BEIRUT

ON APRIL 4th a chemical attack struck the town of Khan Sheikhoun in Idlib, a province in northern Syria controlled by an alliance of rebel groups, including a powerful faction linked to al-Qaeda. At least 85 people, including 20 children, died, according to doctors and a Syrian monitoring group. The World Health Organisation said victims appeared to display symptoms that tally with the use of a deadly nerve agent such as sarin (as opposed to, say, a less powerful one such as chlorine).

One boy was filmed suffocating on the ground, his chest heaving and his mouth opening and closing like a fish out of water. Photographs show dead children lined up in rows on the floor or piled in heaps in the back of a vehicle, their clothes ripped from them by rescuers who used hoses to try to wash the chemicals from their bodies. Other images show victims foaming from their mouths or writhing on the ground as they struggle for air. Hours after the attack began, witnesses say, regime warplanes circled back over the area and dropped bombs on a clinic treating survivors.

After six years of war, international reaction to the attack followed a predictable pattern. The Syrian government swiftly denied dropping chemical weapons. Russia, its ally, said a Syrian air strike had hit a rebel-held weapons stockpile, releasing deadly chemicals into the air. Leaders in the West condemned the regime, but little more. Donald Trump declared that his view of Syria and its dictator had changed, but declined to say what he would do about it.

If the West ends up doing little, it ought not to come as a surprise. When the Syrian government gassed to death more than 1,400 people on the outskirts of Damascus in August 2013 it seemed inevitable that America would respond by launching air strikes against the regime. One week after the attack—the deadliest use of chemical weapons since Saddam Hussein gassed Iraqi Kurds in 1988—John Kerry delivered one of his most bellicose speeches as secretary of state, arguing the case for American military action in Syria. “It matters if the world speaks out...and then nothing happens,” Mr Kerry said.

Yet nothing, at least militarily, is just what happened. Instead, working with the Americans, the Russians brokered a deal that saw the Syrian regime supposedly dismantle its chemical-weapons programme. The Organisation for the Prohibition of Chemical Weapons (OPCW) destroyed about 1,200 tonnes of Syria’s chemical stockpile. Barack Obama hailed the deal as a triumph for diplomacy over force.

Yet chemical attacks by regime forces continued, experts believe. Last year American and European officials began to voice growing fears that Damascus might have held onto nerve agents and other lethal toxins, in defiance of the deal cooked up by Mr Obama and Mr Putin. “Syria has engaged in a calculated campaign of intransigence and obfuscation, of deception, and of defiance,” Kenneth Ward, America’s representative to the OPCW, said in July. “We...remain very concerned that [chemical warfare agents]...have been illicitly retained by Syria.”

All these fears seem to have been borne out. As part of the deal in 2013 to end Syria’s chemical-weapons programme, both America and Russia promised to punish the Syrian regime should it use chemical

weapons again. Despite evidence of the regime’s repeated use of chlorine gas since then, neither side has honoured this promise, at least until now. In February Russia once again blocked efforts at the UN Security Council to sanction military and intelligence chiefs connected to the country’s chemical-weapons programme. A similar fate doubtless awaits the latest attempt by Britain, France and America at the Security Council. Hours after the attack, the three countries demanded a resolution ordering the Syrian government to hand over all flight logs, flight plans and the names of air-force commanders to international inspectors. Russia, however, called the resolution “unacceptable”.

Barring a significant shift in American policy towards military action, the latest use of chemical weapons is unlikely to alter the war’s trajectory much. The rebels are weakening. They lost their enclave in the city of Aleppo, the opposition’s last big urban stronghold, in December. Pockets of resistance remain around Damascus, north of Homs city, and along the southern border with Jordan; but these areas grow ever more isolated. In Idlib an alliance led by a group linked to al-Qaeda has gained strength, allowing America to argue that there are few appropriate rebel partners left to work with on the ground.

Indeed, now that Donald Trump is in charge, removing Mr Assad from power is no longer a stated aim of American policy in Syria. In recent weeks senior American officials said for the first time in public that they could live with Mr Assad as they concentrate on defeating Islamic State. Ironically, this approach would in fact be more likely to fuel further extremism in Syria, as other jihadist groups sought to take advantage of the vacuum that America’s political disengagement presented them with. It would also mean that, with Mr Assad at the

helm, the Syrian regime continued to drop gas on its own people. There would be nothing to stop it.

This article appeared in the Middle East and Africa section of the print edition under the headline "Assad unleashes horror again"

<http://www.economist.com/news/21720252-dictator-defies-world-bashar-al-assad-kills-least-72-chemical>

### **In Kim Jong-nam's Death, North Korea Lets Loose a Weapon of Mass Destruction**

*By Richard C. Paddock, Choe Sang-hun and Nicholas Wade, February 24, 2017*

The Kuala Lumpur International Airport in Malaysia on Friday. The terminal where Kim Jong-nam was assassinated with VX nerve agent on Feb. 13 will be decontaminated despite the passage of time, the police said. CreditAssociated Press

Kuala Lumpur, Malaysia — For years, North Korea has rattled the world with its nuclear tests and its threats to visit a nuclear holocaust upon the United States. Now, the finding by the Malaysian police that Kim Jong-nam was assassinated with VX nerve agent is a stark reminder of the North's lesser-known weapons of mass destruction: a stockpile of chemical and biological weapons.

Mr. Kim, the estranged elder brother of North Korea's leader, Kim Jong-un, was killed on Feb. 13 when two women rubbed his face with the nerve agent at Kuala Lumpur International Airport, the police said on Friday.

If North Korean citizens were behind the killing, as Malaysian officials suggest, the use of VX raises several questions: Was the North Korean government using the attack

to signal to the world its fearsome arsenal of such dangerous weapons? Or was the toxin simply an attempt to avoid detection in carrying out a brazen killing at one of the world's busiest airports?

"By using VX in an international airport in the heart of Asia, North Korea has sent a very clear message to the world that it will strike its enemies anywhere in the world," said Rohan Gunaratna, an expert on terrorism at the S. Rajaratnam School of International Studies in Singapore. "It also demonstrates the North Korean response in the event of an attack against North Korea."

North Korea's nuclear program has long been the most urgent concern of the United States and its allies, and the now-dormant six-party talks to curb the program did not address chemical and biological weapons.

"The reported use of VX reminds us that not only is the North's nuclear-missile threat serious but so are its asymmetric threats, including biochemical weapons and cyber that are all part of the regime's W.M.D. tool kit," said Duyeon Kim, a Seoul-based nonresident fellow at Georgetown University's Institute for the Study of Diplomacy.

South Korea's Foreign Ministry issued a statement on Friday expressing "shock" at the use of a chemical weapon and vowed to work with the international society to deal "strongly" with the violation of the Chemical Weapons Convention.

The deadly use of a chemical weapon banned by international conventions in such a public manner could strengthen calls for the United States to put North Korea back on a list of terrorism-sponsoring countries, analysts said.

The North was first put on the terrorist list after its bombing of a South Korean airliner

near Myanmar in 1987, killing all 115 people onboard. But the United States delisted the country in 2008 as part of an agreement aimed at ending North Korea's nuclear programs — a deal that has since disintegrated with the North's subsequent missile and nuclear weapons tests.

After his announcement that Mr. Kim had been killed by VX nerve agent, Khalid Abu Bakar, the inspector general of the Malaysian police, said on Friday that small amounts of the poison could have been brought into the country without being discovered.

"If the amount of the chemical brought in was small, it would be difficult for us to detect," Mr. Khalid told reporters.

The airport terminal, which handles more than two million passengers a month, will be decontaminated despite the passage of time since the killing, he said.

Two women have been arrested in the killing, one from Indonesia and the other from Vietnam. Their defenders say they were duped into carrying out the attack and thought it was a prank, but Mr. Khalid said they had trained for it and practiced at two major shopping malls. The women used their bare hands to apply the poison on Mr. Kim's face and washed them immediately afterward, he said.

One drop of VX, or about 10 milligrams, can be fatal. But the attackers could have used a safety-enhancing battlefield form of the agent. Known as VX2, it is divided into two compounds that are harmless individually but become lethal when mixed together.

Each component also could have been made in slow-release form, as is done with many drugs.

If Mr. Kim's two assassins had each applied one component of VX, this would explain why

two people were needed, how they survived the attack, and perhaps why it took 15 minutes or more for Mr. Kim to die.

"Use of a binary nerve agent lends itself to this method and allows for a potentially highly targeted hit," said Vipin Narang, an associate professor of political science at the Massachusetts Institute of Technology who has two degrees in chemical engineering.

The woman who applied the second compound would have risked exposing herself to the first component, which could explain why, as Mr. Khalid said on Friday, one of the women became ill and began vomiting after the attack.

This scenario raises the possibility that Mr. Kim could have saved his own life by immediately washing his face rather than going to airport staff members, as he did, to report the attack.

Professor Narang said it was clear that North Korea wanted the West to know what it is capable of — but without causing mass casualties.

"They wanted everyone, especially the U.S., to know it was VX and that they can make it or have it," he said. "Doing it publicly but not killing anyone else is a pretty good way to reveal that capability and deterrent."

In 2014, the South Korean Defense Ministry said the North had stockpiled 2,500 to 5,000 tons of chemical weapons and had a capacity to produce a variety of biological weapons.

Kim Jong-un has a history of resorting to extreme measures against his enemies.

Since taking power after the death of his father, Kim Jong-il, in 2011, he has executed at least 140 senior officials, sometimes killing them with anti-aircraft machine guns and even incinerating some of their bodies with

flamethrowers, according to the Institute for National Security Strategy, a think tank affiliated with South Korea's National Intelligence Service. Such measures were designed as a warning to others, South Korean officials said.

Lee Byong-chul, a nonproliferation expert at the Institute for Peace and Cooperation in Seoul, said the use of VX nerve agent highlights the proliferation threat posed by North Korea, noting that it has been accused of providing chemical weapons technology to Syria since the 1990s.

Shipments of gas masks, gas detectors and other protective gear bound for Syria from North Korea were intercepted in 2009 and 2013.

If confirmed, Mr. Lee said, the use of VX nerve agent by North Korea will very likely weaken the Trump administration's appetite for reopening nuclear disarmament talks, especially after its recent test of what it called a new type of intermediate-range ballistic missile.

China has been the most vocal proponent of new negotiations, but its relations with North Korea have deteriorated sharply. Pyongyang criticized Beijing this week as "dancing to the tune of the U.S."

Steve Vickers, a security consultant based in Hong Kong, said that Mr. Kim's assassination would be seen as a further insult to China, which had protected him for years by allowing him to live in the Chinese territory of Macau.

"This is clearly an embarrassment for the Chinese state security and to a lesser extent to the Malaysian government," Mr. Vickers said.

<https://www.nytimes.com/2017/02/24/world/asia/north-korea-kim-jong-nam->

[vx-nerve-agent.html?rref=collection%2Ftimestopic%2FBiological%20and%20Chemical%20Warfare](#)

## **Jumping to conclusions; something is not adding up in Idlib chemical weapons attack**

*By Paul Antonopoulos*

Beirut, Lebanon – At least 58 people were killed in a horrific gas attack in the Idlib Governorate this morning. However, even before investigations could be conducted and for evidence to emerge, Federica Mogherini, the Italian politician High Representative of the European Union (EU) for Foreign Affairs and Security Policy, condemned the Syrian government stating that the "Assad regime bears responsibility for 'awful' Syria 'chemical' attack."

The immediate accusation from a high ranking EU official serves a dangerous precedent where public outcry can be made even before the truth surrounding the tragedy can emerge

Israeli President, Benjamin Netanyahu, joined in on the condemnation, as did Amnesty International.

Merely hours after the alleged chemical weapons attack in Khan Sheikun, supposedly by the Syrian government, holes are beginning to emerge from opposition sources, discrediting the Al-Qaeda affiliated White Helmets claims.

For one, seen in the above picture, the White Helmets are handling the corpses of people without sufficient safety gear, most particularly with the masks mostly used, as well as no gloves. Although this may seem insignificant, understanding the nature of sarin gas that the opposition claim was used, only opens questions.

Within seconds of exposure to sarin, the effects of the gas begins to target the muscle and nervous system. There is an almost immediate release of the bowels and the bladder, and vomiting is induced. When sarin is used in a concentrated area, it has the likelihood of killing thousands of people. Yet, such a dangerous gas, and the White Helmets are treating bodies with little concern to their exposed skin. This has to raise questions.

It also raises the question why a “doctor” in a hospital full of victims of sarin gas has the time to tweet and make video calls. This will probably be dismissed and forgotten however.

<https://www.almasdarnews.com/article/jumping-conclusions-something-not-adding-idlib-chemical-weapons-attack/>

### **OPCW Executive Council Meets to Address Alleged Use of Chemical Weapons in the Syrian Arab Republic**

*April 13, 2017*

The Hague, Netherlands — 13 April 2017 — On 4 April, reports emerged of the alleged use of chemical weapons in the Khan Sheikun area of southern Idlib in the Syrian Arab Republic.

Today, the Chairperson of the Organisation for the Prohibition of Chemical Weapons (OPCW) Executive Council, Ambassador Odette Melono of Cameroon in consultation with the Director-General of the OPCW, Ambassador Ahmet Üzümcü, convened a meeting of the Council to discuss these allegations.

The Director-General shared with the Executive Council the immediate steps taken by Technical Secretariat experts to analyse the available information and their preliminary assessment that this was a credible allegation. He also shared that the

OPCW Fact-Finding Mission has focused its work to investigate the incident in Khan Sheikun and that it has collected samples, which have been sent to OPCW Designated Laboratories for analysis. OPCW experts are currently analysing all information gathered from various sources. The Director-General reiterated his call for States Parties that are in a position to do so to share with the Secretariat any relevant information without delay and allow the FFM to complete its work within the next two to three weeks.

In closing, the Director-General expressed, “Our experts are fully aware of the significance of the task they are expected to fulfil and I am confident that they will do it in a professional and impartial manner using all available technical means”.

The Executive Council has suspended the meeting and decided to reconvene next week to continue discussions on the alleged incident.

<https://www.opcw.org/news/article/opcw-executive-council-meets-to-address-alleged-use-of-chemical-weapons-in-the-syrian-arab-republic/>

### **OPCW Director-General Shares Incontrovertible Laboratory Results Concluding Exposure to Sarin**

*April 19, 2017*

The Hague, Netherlands — 19 April 2017 — The Executive Council of the Organisation for the Prohibition of Chemical Weapons (OPCW) reconvened today to further address the allegation of chemical weapons use in the Khan Sheikun area of southern Idlib in the Syrian Arab Republic. OPCW's Director-General, Ambassador Ahmet Üzümcü updated Council members on recent developments regarding the OPCW Technical Secretariat's activities.

Ambassador Üzümcü underscored that the Fact-Finding Mission (FFM) continues its work using procedures and methodologies consistent with its mission and reaffirmed that the FFM has been endorsed by the relevant decisions of the Executive Council and applicable resolutions of the UN Security Council. He reiterated his full confidence in the professionalism and impartiality of colleagues comprising the Fact-Finding Mission teams.

The bio-medical samples collected from three victims during their autopsy were analysed at two OPCW designated laboratories. The results of the analysis indicate that the victims were exposed to Sarin or a Sarin-like substance. Bio-medical samples from seven individuals undergoing treatment at hospitals were also analysed in two other OPCW designated laboratories. Similarly, the results of these analyses indicate exposure to Sarin or a Sarin-like substance.

Director-General Üzümcü stated clearly: "The results of these analyses from four OPCW designated laboratories indicate exposure to Sarin or a Sarin-like substance. While further details of the laboratory analyses will follow, the analytical results already obtained are incontrovertible."

In the meantime, the Fact-Finding Mission is continuing with interviews, evidence management and sample acquisition. The Director-General reported that an FFM team is ready to deploy to Khan Sheikhun should the security situation permit. He reminded the Executive Council of the 27 May 2014 attack on an FFM team and the action the Council subsequently took in emphasising the importance of safety and security of OPCW experts deployed to Syria.

The FFM is still anticipated to complete a first report of its findings to be submitted to States Parties of the Chemical Weapons

Convention within two weeks and the Director-General will make the report available to the OPCW-UN Joint Investigative Mechanism.

Ambassador Üzümcü repeated his request for the continued support of all States Parties, including through the provision of relevant information, to ensure that the Technical Secretariat is able to pursue its work, and to allow it to fulfil the OPCW mission within a reasonable time frame.

The Executive Council decided to reconvene tomorrow, 20 April, to vote on a draft decision under discussion.

## **Background**

The OPCW Fact-Finding Mission initiated its work on 5 April 2017 after the Technical Secretariat's preliminary assessment that the 4 April incident was a credible allegation. The FFM is led by, and predominately comprised of, experienced and impartial inspectors with support from experts from various units across the Technical Secretariat.

## **OPCW Designated Laboratories**

The OPCW has been organising and conducting Official Proficiency Tests since 1996. Under the provisions of the CWC, the purpose of these tests is to certify laboratories for the analysis of authentic samples. As a result of efforts by the OPCW and States Parties spanning many years, it became possible to build-up an open-ended network of OPCW Designated Laboratories.

OPCW Designated Laboratories are a lynchpin of the Organisation's verification regime and its capacity to investigate possible violations of the Convention. They must be able to perform off-site analysis of chemical samples collected by OPCW inspectors from chemical production facilities, storage depots

and other installations, or from the site of an alleged use of chemical weapons, and provide forensic proof if a violation of the Convention has occurred. These laboratories offer the necessary assurance to our States Parties that chemical analyses needed to make determinations or to clarify issues occurring during OPCW inspections are carried out competently and with unambiguous results.

The Proficiency Tests are conducted on a twice-yearly basis and are open to all interested laboratories from OPCW Member States. Applicants need to achieve high scores on three consecutive tests to be awarded the status of Designated Laboratory. There are currently 18 OPCW Designated Laboratories in Europe, Asia and the United States of America.

*<https://www.opcw.org/news/article/opcw-director-general-shares-incontrovertible-laboratory-results-concluding-exposure-to-sarin/>*

### **OPCW Press Release on Allegations of Chemical Weapons Use in Southern Idlib, Syria**

*April 04, 2017*

THE HAGUE, Netherlands — 4 April 2017 — The Organisation for the Prohibition of Chemical Weapons (OPCW) is seriously concerned about the alleged chemical weapons attack reported by the media this morning in the Khan Shaykhun area of southern Idlib in the Syrian Arab Republic. The OPCW's Fact Finding Mission (FFM) is in the process of gathering and analysing information from all available sources. The FFM will report its findings to the OPCW's Executive Council and States Parties to the Chemical Weapons Convention.

The OPCW strongly condemns the use of chemical weapons by anyone, anywhere and under any circumstances.

### **Background**

The Chemical Weapons Convention comprehensively prohibits the use, development, production, stockpiling and transfer of chemical weapons. Any chemical used for warfare is considered a chemical weapon by the Convention.

In response to persistent allegations of chemical weapon attacks in Syria, the OPCW Fact Finding Mission (FFM) was set up in 2014 "to establish facts surrounding allegations of the use of toxic chemicals, reportedly chlorine, for hostile purposes in the Syrian Arab Republic". The FFM is required to study available information relating to allegations of use of chemical weapons in Syria, including information provided by the Syrian Arab Republic and others.

Since May 2014, the OPCW has deployed the FFM in numerous occasions to the Syrian Arab Republic and outside of Syria and has kept States Parties informed of its work. The FFM interviews witnesses and obtains samples and physical evidence for analysis.

In 2015, the OPCW Executive Council and the UN Security Council endorsed the continual operation of the FFM.

The FFM's findings established the facts surrounding allegations of the use of toxic chemicals as weapons in Syria and confirmed that chemical weapons had been used. The FFM's findings were the basis for the work of the OPCW-UN Joint Investigative Mechanism (JIM), an independent body established by the UN Security Council (Resolution 2235, 7 August 2015). The JIM's purpose is to identify the perpetrators of the chemical weapon attacks confirmed by the Fact Finding Mission.

As the implementing body for the Chemical Weapons Convention, the OPCW oversees

the global endeavour to permanently eliminate chemical weapons. Since the Convention's entry into force in 1997 – and with its 192 States Parties – it is the most successful disarmament treaty eliminating an entire class of weapons of mass destruction.

To date, nearly 95 per cent of all chemical weapon stockpiles declared by possessor States have been destroyed under OPCW verification. For its extensive efforts in eliminating chemical weapons, the OPCW received the 2013 Nobel Prize for Peace.

<https://www.opcw.org/news/article/opcw-press-release-on-allegations-of-chemical-weapons-use-in-southern-idlib-syria/>

### **UPDATED Media Brief: Reported Use of Chemical Weapons, Southern Idlib, Syria, 4 April 2017**

*April 07, 2017*

### **Understanding the OPCW and the Chemical Weapons Convention**

- The Organisation for the Prohibition of Chemical Weapons (OPCW) is a treaty-based international organisation that operates according to a strict confidentiality regime, which governs the operations of the Organisation, protects the integrity of its investigations, ensures the security of its technical experts, and determines what information can be made public.
- The OPCW is responsible for the implementation of the Chemical Weapons Convention (CWC), which comprehensively prohibits the use, development, production, stockpiling and transfer of chemical weapons.

- The Chemical Weapons Convention prohibits the use of toxic chemicals to kill or harm, regardless of their source.

### **OPCW, the Chemical Weapons Convention, and the Syrian Arab Republic**

- Syria became a State Party to the Chemical Weapons Convention and a Member State of the OPCW in October 2013. As a result of a joint OPCW-UN mission, in cooperation with the Syrian government, all of the chemical weapons declared by Syria were removed and destroyed outside of Syrian territory.
- Questions have been raised as to whether Syria's declaration about its chemical weapons programme to the OPCW was complete and correct. In 2014, the OPCW Director-General established a team of experts from the Technical Secretariat to engage the relevant Syrian authorities to resolve the identified gaps and inconsistencies in the Syrian declaration. The team of experts known as the Declaration Assessment Team (DAT) undertook 18 visits to Syria, held several meetings with Syrian authorities, visited former chemical weapons sites, and took samples. The DAT has submitted several reports to States Parties of the Chemical Weapons Convention.

In July 2016, the Director-General informed the Executive Council, through his report to the Council's 82nd session, that the Technical Secretariat was not able to resolve all identified gaps, inconsistencies and discrepancies in Syria's declaration and therefore could not fully verify that Syria had submitted a declaration that could be considered accurate and complete in accordance with the Chemical Weapons Convention and

Executive Council decision ECM-33/DEC.5. The Director-General submitted his report after high-level consultations with the Syrian Arab Republic.

- Starting in 2013, the OPCW has adapted itself in unprecedented ways, such as the joint OPCW-UN Mission with the support of 30 nations to remove, transport and destroy Syria's declared chemical weapons stockpile in the midst of an active conflict zone.
- In accordance with CWC and the relevant decisions of the OPCW Executive Council as well as UN Security Council Resolution 2118 (2013), the Syrian Arab Republic and all groups and parties in Syria are obliged not to develop, produce, retain or use chemical weapons or toxic chemicals as weapons.

#### **OPCW Response to the 4 April 2017 Incident**

- The OPCW is investigating the incident in southern Idlib under the on-going mandate of the Fact-Finding Mission (FFM), which is "to establish facts surrounding allegations of the use of toxic chemicals, reportedly chlorine, for hostile purposes in the Syrian Arab Republic". The OPCW cannot and will not release information about an on-going investigation. This policy exists to preserve the integrity of the investigatory process and its results as well as to ensure the safety and security of OPCW experts and personnel involved. All parties are asked to respect the confidentiality parameters required for a rigorous and unimpeded investigation.
- The OPCW Technical Secretariat has initiated contact with the Syrian authorities. It has also requested that all

States Parties to the Chemical Weapons Convention, in a position to do so, share any information they may have regarding the allegations of chemical weapons use in the Khan Sheikhun area of Idlib province in the Syrian Arab Republic.

- The findings of the FFM will be submitted in a report to the OPCW Executive Council and States Parties of the Chemical Weapons Convention.
- In response to persistent allegations of chemical weapon attacks in Syria, the FFM was set up in 2014 "to establish facts surrounding allegations of the use of toxic chemicals, reportedly chlorine, for hostile purposes in the Syrian Arab Republic". The FFM is required to study available information relating to allegations of use of chemical weapons in Syria, including information provided by the Syrian Arab Republic and others. The FFM employs investigative methods to determine if chemical weapons have been used. It interviews witnesses and obtains environmental and biomedical samples and physical evidence for analysis.
- Since May 2014, the OPCW has deployed the FFM in numerous occasions to the Syrian Arab Republic and outside of Syria and has kept States Parties informed of its work.
- In 2015, the OPCW Executive Council and the UN Security Council endorsed the continual operation of the FFM.
- Since its establishment, the FFM has looked into several incidents of allegations of use of chemical weapons in Syria. In this context, the FFM has confirmed with "high degree of confidence" that Chlorine and Mustard were used as weapons in its investigations into past allegations of

chemical weapons use. These reports were submitted to States Parties to the CWC and also transmitted to the UN Security Council.

### ***The OPCW-UN Joint Investigative Mechanism***

- The OPCW-UN Joint Investigative Mechanism (JIM) was established by the UN Security Council (Resolution 2235, 7 August 2015) with the mandate to identify “to the greatest extent feasible” individuals, entities, groups, or governments who were perpetrators, organisers, sponsors or otherwise involved in the use of chemicals as weapons in Syria, where the OPCW FFM determines or has determined that a specific incident involved or likely involved the use of chemicals as weapons.
- The JIM, as a subsidiary organ of the United Nations Security Council, carries out its further investigations and makes its findings as an independent body. It presents its reports to the Security Council, and informs the OPCW.

<https://www.opcw.org/news/article/media-brief-reported-use-of-chemical-weapons-southern-idlib-syria-4-april-2017/>

## **DISARMAMENT**

### **Weren't Syria's Chemical Weapons Destroyed? It's Complicated**

*By Scott Shane, April 7, 2017*

Washington — When the Syrian government carried out a gruesome chemical attack on civilians this week, many people had a question: Didn't the Obama administration, working with Russia and international

experts, destroy Syria's chemical weapons stocks in 2014?

In his State of the Union address that year, President Barack Obama declared, “American diplomacy, backed by the threat of force, is why Syria's chemical weapons are being eliminated.” Months later, in July, on NBC's “Meet the Press,” Secretary of State John Kerry essentially declared the mission accomplished: “We struck a deal where we got 100 percent of the chemical weapons out.”

But, as became obvious when a Syrian attack on Tuesday killed more than 80 people, the truth was more complicated. Here is a primer on the history of Syria's chemical stockpile, the effort to eliminate it and experts' views on the new attack.

When did Syrian forces first use chemical weapons, and how did the United States respond?

Scattered reports of chemical attacks have been made since the beginning of the Syrian civil war in 2011, but a large-scale attack in August 2013 — with United Nations inspectors already on the ground — got the world's attention. Mr. Obama said he intended to carry out a limited military strike to uphold the international ban on chemical weapons and deter further attacks. Then he decided to seek authorization from Congress first.

But congressional support for strikes was lukewarm. Russia, seeking to head off American military retaliation, proposed an international effort to document and destroy Syria's chemical stocks. Mr. Obama, facing possible defeat in Congress, accepted.

Who did the work to find and eliminate the chemical weapons?

The Organization for the Prohibition of Chemical Weapons sent a team to Syria. Established in 1997 and based in The Hague, the organization is charged with enforcing the Chemical Weapons Convention that bans such arms. As of last fall, it reported that 67,098 metric tons of chemical agents, or 90 percent of the world's declared stockpile of 72,304 metric tons, had been "verifiably destroyed."

How did the process work?

First, the Syrian government issued a declaration ostensibly listing its stock of chemical weapons, though some American officials and independent experts were skeptical about whether it was complete. Teams from the O.P.C.W. visited 21 weapon-making sites to confirm that Syria had dismantled or destroyed its equipment; two other sites were considered too dangerous to visit because of fighting, but inspectors believed that they, too, had been taken apart.

The weapons, and chemicals used to make them, were diluted to make the material less dangerous to transport and then loaded onto a Danish ship in the Syrian port of Latakia. That ship, under the protection of Russia and China, delivered the chemicals to an American Navy vessel, the Cape Ray, where the chemicals were neutralized. More shipments followed, and in January 2016, the O.P.C.W. announced that the last of the Syrian stocks had been destroyed.

So did that eliminate the threat?

Not entirely, though by all accounts, it removed lethal weapons that could have caused slaughter and suffering on a huge scale. Even as the O.P.C.W. completed its mission, new reports emerged of scattered

attacks in Syria using chlorine and other suspected chemicals.

Obama administration officials say that they always believed Mr. Assad might be withholding at least small chemical supplies, and that in public statements, Mr. Kerry and others tried to refer to the elimination of Syria's "declared" stocks, a nuance often lost in news reports. American officials repeatedly returned to the Organization for the Prohibition of Chemical Weapons with intelligence reports on remaining chemical stocks, pressing for further action.

Despite the failure to completely eliminate Syria's chemical weapons, Obama administration officials and outside experts considered the program fundamentally a success. "We strongly believed it was better to get 1,300 tons of chemical weapons out of the hands of the Syrian regime, or let them fall into the hands of ISIL," Jonathan Finer, who was Mr. Kerry's chief of staff and is now a fellow at the Institute of Politics at Harvard, said, using another name for the Islamic State.

Where did the nerve agent used in the attack this week come from?

Two possibilities are receiving attention: that the agent, sarin, was in stocks Mr. Assad hid from inspectors, or that weapons specialists in the Syrian government manufactured a new supply. While it is not simple to make sarin, it is possible in a small lab that could be easily hidden in a basement, out of sight of inspectors and foreign spy satellites.

Why did the Syrian government decide to carry out this massacre?

One underlying factor in Syria's latest attack may have been perceived signals of apathy from Russia and the United States. Russia proposed and participated in the destruction

of weapons stocks, but since 2015, Russian officials, who have long supported Mr. Assad, have repeatedly denied or obfuscated evidence of new chemical attacks by the government.

And President Trump, who publicly opposed American military action after the 2013 attack, had strongly suggested that his main concern in Syria was defeating the Islamic State, not restraining the government.

Some 500,000 people have died in the Syrian civil war. Why do the hundreds killed by chemical weapons get so much attention?

Some peace activists have asked that very question, suggesting that the disproportionate news coverage is illogical. But Daryl G. Kimball, executive director of the Arms Control Association, an advocacy group in Washington, said that since the horrors of World War I, an international consensus has put chemical weapons in a special category. "They're indiscriminate weapons, and they kill in a particularly horrific way," Mr. Kimball said. "They're taboo."

<https://www.nytimes.com/2017/04/07/world/middleeast/werent-syrias-chemical-weapons-destroyed-its-complicated.html?ref=collection%2Ftimestopic%2FBiological%20and%20Chemical%20Warfare>

### **Key Points on Sarin: The 'Most Volatile' of Nerve Agents**

*By Russell Goldman, April 6, 2017*

The victims of a bombing in northern Syria this week were exposed to sarin, a banned but easily manufactured poison that has been widely used in chemical weapons, Turkish officials who conducted autopsies on the victims said on Thursday.

What is sarin?

Sarin is a nerve agent, one of a class of chemical weapons that affect the brain's ability to communicate with the body's organs through the nervous system. It is a colorless, tasteless, odorless liquid that was first synthesized in Germany in 1938 as a potential pesticide.

Sarin is considered "the most volatile of the nerve agents," according to the Centers for Disease Control and Prevention. "This means it can easily and quickly evaporate from a liquid into a vapor and spread into the environment."

Sarin vapor does not last long, but it can be deadly if inhaled. Contact with sarin liquid on exposed surfaces, in food, or in water can also be fatal. Its effects may strike quickly or be delayed after exposure.

How does it work?

All nerve agents belong to a class of organic compounds that contain phosphorus, and work in essentially the same way, by inhibiting the action of a crucial enzyme in the body that allows muscles and organs to contract. Without the enzyme's action, the muscles and organs are constantly stimulated and stop working properly; asphyxiation soon follows.

How is it weaponized?

Sarin is dangerous to handle and has a short shelf life, so it is usually stored in the form of two separate precursor compounds that will produce sarin when mixed together.

On the battlefield, sarin and other nerve agents can be used against targets by spraying them as a liquid or an aerosol. Chemical bombs are designed to spray out the liquid on detonation. The Syrian

government is believed to have used such a bomb this week in Idlib Province.

The United Nations Chemical Convention, which bans the use of sarin in war, went into effect in 1997. The Syrian government agreed in 2013 to destroy its chemical weapons stockpile, including sarin.

How toxic is it?

According to the United States military, sarin is 81 times as toxic as cyanide and 543 times as toxic as chlorine, which has been used in Syria as a chemical weapon. Chlorine has legitimate commercial uses and is not banned.

What are the symptoms of exposure?

Symptoms of exposure may include the pupils of the eyes shrinking to pinpoints, rapid breathing, vomiting, convulsions, paralysis and respiratory failure. Swift medical attention can reverse the effects of low levels of exposure.

<https://www.nytimes.com/2017/04/06/world/middleeast/sarin-nerve-agent.html?rref=collection%2Ftimestopic%2FBiological%20and%20Chemical%20Warfare>

### **Use of Nerve Agent in Kim Jong-nam Killing Is Condemned by Malaysia**

*By Richard C. Paddock And Choe Sang-hun, March 2, 2017*

Kuala Lumpur, Malaysia — The Malaysian Foreign Ministry said Friday that it was “greatly concerned” by the use of a banned chemical weapon in a public place to assassinate Kim Jong-nam, the half brother of North Korea’s leader, and has asked for international help in responding to the episode.

“The ministry strongly condemns the use of such a chemical weapon by anyone, anywhere and under any circumstances,” the ministry said in a statement. “Its use at a public place could have endangered the general public.”

Malaysia has reported the use of the toxic chemical, VX nerve agent, to the Organization for the Prohibition of Chemical Weapons, which monitors chemical weapons banned under international conventions. The organization must now decide whether to bring the matter of the chemical’s illegal use before the United Nations Security Council.

Analysis of chemical residue on Mr. Kim found it to be VX nerve agent. South Korea has blamed the North for the killing. The Malaysian police have identified seven North Korean men who remain wanted for questioning in the case.

If there is compelling evidence that North Korea used the substance, the United States and its allies can push for a resolution against the North at the Security Council and for new sanctions. Washington can also place the North back on its terrorism-sponsor blacklist.

But North Korea has already been under heavy sanctions for decades, and analysts say that new steps against the North will have a largely symbolic effect of “naming and shaming.” Such a move could further dampen what is an already weak desire to start dialogue with the North to address its growing nuclear and missile threats, they said.

Malaysia reported the incident to the O.P.C.W. soon after the discovery that the poison was VX nerve agent, and since then the organization has been providing Malaysia

with assistance in its investigation of the killing.

### Top of Form

“The ministry is in close contact with the O.P.C.W. regarding the recent incident and the latter has provided the Malaysian authority with some technical materials that have been requested to assist in its investigation,” the ministry said.

Mr. Kim, the elder brother of North Korean leader Kim Jong-un, was killed on Feb. 13 at Kuala Lumpur International Airport by two foreign women who smeared his face with poison, the police say. The two women, one from Indonesia and one from Vietnam, have been charged with murder.

North Korea, which has not been allowed to examine Mr. Kim’s body, asserts that he died of heart failure. North Korean officials contend that it is absurd for Malaysia to say that VX nerve agent was used since it is so toxic that many others at the airport also would have died.

After Malaysia reported the use of the chemical, representatives of the O.P.C.W. came to Kuala Lumpur to provide assistance, one official said.

“The government of Malaysia will fully cooperate with the O.P.C.W. and other international organizations to bring the perpetrators to justice,” the ministry said.

The Malaysian authorities on Friday released Ri Jong-chol, the only North Korean detained in the killing so far, and handed him over to immigration officials for deportation. The police also issued an arrest warrant for Kim Uk-il, 37, a North Korean who works for Air Koryo, the national airline. The authorities have said that they believed Mr. Kim was at the North Korean Embassy in Kuala Lumpur

along with another suspect, Hyon Kwang-song, an embassy employee.

<https://www.nytimes.com/2017/03/02/world/asia/kim-jong-nam-malaysia.html?rref=collection%2Ftimestopic%2FBiological%20and%20Chemical%20Warfare>

### **Biological weapons of mass destruction with the ability to spread deadly diseases like Ebola and Zika ‘could wipe out up to a fifth of the world’s population’**

- **Ex-Nato commander warned about threat of advanced biological technology**
- **James Stavridis said could lead to epidemic ‘not dissimilar to Spanish influenza’**
- **He said prospect of terrorists using bio-weapons was ‘most alarming’**

*By Emily Chan For Mailonline  
December 26, 2016*

Biological weapons of mass destruction with the ability to spread deadly diseases like Ebola and Zika could wipe out up to a fifth of the world’s population, it has been claimed.

Ex-Nato commander James Stavridis described the prospect of advanced biological technology being used by terrorists or ‘rogue nations’ as ‘most alarming’.

He said that it could lead to an epidemic ‘not dissimilar to the Spanish influenza’ a century ago.

Writing in Foreign Policy, Stavridis said: ‘In that plague, by some estimates, nearly 40 percent of the world’s population was infected, with a 10 to 20 percent mortality rate.

'Extrapolated to our current global population, that would equate to more than 400 million dead.'

He continued: 'Most alarming would be that either rogue nations or violent transnational groups would gain access to these technologies and use them to create biological weapons of mass destruction.'

Last year, an EU report suggested that ISIS has recruited experts to wage war on the West using chemical and biological weapons of mass destruction.

It warned: 'At present, European citizens are not seriously contemplating the possibility that extremist groups might use chemical, biological, radiological or nuclear (CBRN) materials during attacks in Europe.'

'Under these circumstances, the impact of such an attack, should it occur, would be even more destabilising.'

Intelligence services were also warned to screen returning Jihadi fighters for 'specialist CBRN knowledge'.

<http://www.dailymail.co.uk/news/article-4066952/Biological-weapons-mass-destruction-ability-spread-deadly-diseases-like-Ebola-Zika-wipe-fifth-world-s-population.html>

### **India must be prepared for biological warfare: Manohar Parrikar**

BY PTI , March 02, 2017,

New Delhi: Defence Minister Manohar Parrikar today said India must be well-prepared to deal with chemical and biological warfare in the wake of changing threat perception and security concerns.

Referring to reports of use of chemical weapons in recent terror attacks in Afghanistan, he said India should have an effective system in place to prevent potential consequences against use of chemical or biological weapons.

"The reports which are coming from the southern and northern parts of Afghanistan... I have seen photographs of local population suffering from blisters. At this moment, I don't have confirmation on this, but the photos were quite disturbing.

"We should be prepared for any kind of warfare," he said during an event organised by the DRDO.

Echoing Parrikar's concerns, Army Chief General Bipin Rawat said the Armed Forces must be prepared for all kinds of threat.

"Although chemical weapons have been banned by the United Nations, it could be used by an adversary," he said.

Parrikar and Rawat were speaking at an event where the DRDO handed over Nuclear, Biological, Chemical(NBC) Reconnaissance Vehicle and NBC drugs to the Army.

There were reports which suggested use of chemical weapons in certain areas in Northern and Southern Afghanistan as people there had blisters and wounds.

More than a dozen people were killed in near-simultaneous attacks in Kabul yesterday. In the first attack, a suicide car bomber targeted a police station in western Kabul. The explosion was followed by a gun fight between the police and several attackers.

A bomber detonated explosives outside offices of the intelligence service in eastern Kabul in the second attack.

<http://economictimes.indiatimes.com/news/defence/india-must-be-prepared-for-biological-warfare-manohar-parrikar/printarticle/57435338.cms>

## **Safety Standards Improved in Latin American Research Labs**

*May 15, 2017*

The Hague, the Netherlands — 15 May 2017 — laboratory personnel gained in-depth knowledge needed to nurture a culture of safety, security and responsibility in research and academia, during a course on chemical safety and security management in laboratories for member states in the Latin America and Caribbean region, held from 24 to 28 April in Buenos Aires, Argentina.

The course was sponsored by the Organisation for the Prohibition of Chemical Weapons (OPCW), the Instituto Nacional de Tecnología Industrial (INTI), and the Argentinian Government, and aimed at enhancing the capacity of laboratories in the region to promote a culture of safety and security.

Key aspects of the programme included theoretical lectures on various policy and practical aspects related to the Organisation and the management of lab infrastructures. Particular emphasis was placed upon waste management, personal protection measures, emergency management, toxicology and regulations, management of toxic chemicals, and the Global Harmonized System (GHS). The theoretical programme was followed by guided tours to various sectorial laboratories of (INTI) where participants observed safety measures in place and discussed them with the INTI staff involved.

The programme was conducted at INTI facilities, in Spanish, and was attended by 12 participants from El Salvador, Peru, Guatemala, Chile, Brazil, Uruguay, Costa Rica, Venezuela, Peru, Ecuador, and Panama and 32 local participants. Each participant had a professional background in chemistry and is currently working on the application of occupational safety in public and private entities.

The course is one of many new international cooperation programmes the OPCW has tailored to scientists working in various fields of chemistry. It was well received by participants, organisers and local authorities.

Victor Yanssen from the Training Department of the Superintendence of Labor Risks of Argentina said the level of detail the course went into on a regional and international level, gave him new insights into how Argentina could strengthen its local safety and security frameworks. Marcos Salazar, Chemist, Professor at the University of Panama, and Member of the Laboratories of the Center for Research and Information on Medicines and Toxics said that the most useful elements of the programme for him were the technical explanations and demonstrations of how to implement and maintain optimum laboratory safety and security on a practical day-to-day level.

The closure of the course was followed by a solemn ceremony of the celebration of the 20th Anniversary of the OPCW, attended by the representatives of the Ministry of Foreign Affairs of Argentina and other guests. The ceremony featured speeches from the Vice-Chancellor, H.E. Mr Pedro Villagra Delgado, and a representative of the OPCW, and featured OPCW's 20th anniversary video and a video message of progress from the Director-General, Ambassador Ahmet Üzümcü.

## Background

As the implementing body for the Chemical Weapons Convention, the OPCW oversees the global endeavour to permanently and verifiably eliminate chemical weapons. Since the Convention's entry into force in 1997 – and with its 192 States Parties – it is the most successful disarmament treaty eliminating an entire class of weapons of mass destruction.

To date, nearly 95 per cent of all chemical weapon stockpiles declared by possessor States have been destroyed under OPCW verification. For its extensive efforts in eliminating chemical weapons, the OPCW received the 2013 Nobel Prize for Peace.

*<https://www.opcw.org/news/article/safety-standards-improved-in-latin-american-research-labs/>*

## Caribbean and Central American States Committed to Advancing Implementation of Chemical Weapons Convention

*April 04, 2017*

THE HAGUE, Netherlands — 7 April 2017 — A workshop run by the Organisation for the Prohibition of Chemical Weapons (OPCW) provided tailored assistance to countries in the Caribbean and Central America that have yet to draft their national implementing legislation - in Bridgetown, Barbados from 21 to 24 March 2017.

The workshop gave legal drafters and national authority representatives for States Parties in the Caribbean and Central America the opportunity to create initial draft legislation under the guidance of OPCW's International Cooperation and Assistance Branch.

Permanent Secretary from the Ministry of the Environment and Drainage of Barbados, Mr Edison Alleyne, underscored in his opening remarks the importance of national implementation by States Parties in the region: "While we may not produce chemical weapons, many of our countries use or generate toxic chemicals through activities not prohibited under the Convention - which could be precursors for the manufacture of chemical weapons. We must remind our stakeholders of this, not to scare them, but to stress the importance of having a comprehensive chemical management process with a strong legal foundation."

To date, a number of States Parties in Latin America and the Caribbean have yet to adopt comprehensive implementing legislation of the Chemical Weapons Convention (CWC). Out of the 33 States Parties in the area, only 15 have legislation covering all the elements required under the Convention, while nine States Parties have legislation covering only some of these elements. Nine others have yet to adopt any legislation.

The Workshop consisted of two days of presentations to familiarise participants with the CWC, and two days of drafting sessions to equip participants with technical skills to draft the legislation and pursue its adoption.

By the end of the four day session, each participant presented draft legislation that was fully in line with the provisions of the CWC, meets the requirements of their respective national legislative bodies, and could be submitted to their parliaments.

Into the future, the OPCW will continue to monitor the progress of adoption of draft legislation by States Parties.

The event brought together 30 participants from Antigua and Barbuda, Barbados, Belize, Dominican Republic, Guatemala, Honduras and Nicaragua and was hosted with EU funding.

## **Background**

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*<https://www.opcw.org/news/article/caribbean-and-central-american-states-committed-to-advancing-implementation-of-chemical-weapons-convention/>*

# Book Review

## Chemical Control: Regulation of Incapacitating Chemical Agent Weapons, Riot Control Agents and their Means of Delivery

Michael Crowley -  
University of Bradford UK,  
Editor: Jim Whitman

ISBN: 978-1-349-55565-9

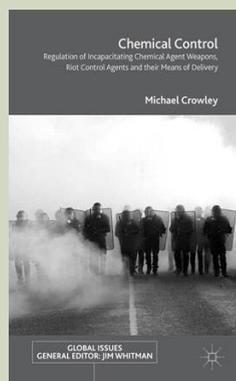
Palgrave Macmillan, 2016,  
London

Natallia Khaniejo

*The author is a research  
intern at IDSA.*

### Summary

The recent resurgence of Chemical weapon usage as a means of causing chaos and spreading fear demonstrates the inability of current containment protocol to effectively control their production and proliferation. Through Chemical Control, Dr. Michael Crowley attempts to examine and analyze the current framework surrounding chemical weapons discourse in the hopes of instituting a more comprehensive policy framework through which Holistic Arms Control may be effected / implemented.



April 2017 witnessed another attack in a string of Chemical attacks that has devastated the Syrian region in the Twenty first Century. The subject of Chemical Warfare and the usage of chemical weapons in geopolitical conflicts is a tale as old as time – as is evinced by mythical and anthropological narratives of arrowheads coated with paralyzing natural toxins. World War I witnessed one of the worst implementations of Poison Gas as a means of incapacitation and in 1925 the League of Nations approved the Geneva Protocol which banned the usage of chemical weapons. However, given the complexities and challenges of the League, and the limited vision of the Protocol itself, this containment measure didn't prevent nations from building and stockpiling Chemical weapons and the Cold War era witnessed some of the most rampant and competitive production of Chemical and Biological weapons which continued until the collapse of the Soviet Union. The collapse eventually paved the way for the Chemical Weapons Convention (CWC) which is an arms control treaty that “outlaws the production, stockpiling and use of Chemical Weapons and their precursors.”<sup>2</sup> This treaty was signed in 1993, came into force in 1997 and has been administered by the Organization for the Prohibition of Chemical Weapons (OPCW) since. Given the re-emergence and usage of dated Chemical Weapon stockpiles in the Syrian conflict, there is a need to re-engage with this resurgent proliferation of Chemical Weapons and their current implementation for the purposes of causing instability.

Dr. Michael Crowley's book, Chemical Control: Regulation of incapacitating Chemical Agent Weapons, Riot Control Agents and their Means of Delivery is an examination of the current international

discourse surrounding the usage and proliferation of Chemical weapons. Dr. Crowley examines the current framework surrounding the dispensation and applicability of Chemical weapons as deterrents/defense mechanisms/tools of state control. The author also tackles the abstruseness of the current framework surrounding this discourse and demonstrates how this ambiguity and obscurity of definitions and protocols is creating an environment of easy access to and rapid proliferation of such dangerous technologies. Chemical weapons and their usage by States as well as Non State Actors, form a part of non-traditional warfare, that could have unpredictable and devastating effects on their victims, spatially as well as temporally. The author examines the current global debate surrounding the issue and works towards suggesting mechanisms that can be used to implement a Holistic Arms Control (HAC) treaty.

Dr. Crowley scrutinizes the issue holistically, by examining past precedent, current theoretical as well as practical frameworks, documented and undocumented case studies and potential emergent scenarios to form a structure within which the reader can place current Chemical Warfare and its discourse. The book is divided into 13 chapters that each examine a different facet of the current global debate and the ambiguous consensus that has served as an apathetic deterrent against creating an enforceable framework of Chemical Control. The book begins by providing the reader with the basic contextual tools they would need to engage with the issue. The introduction outlines the key concepts that will be examined subsequently, it then provides a basic understanding of Incapacitating Chemical Agent Weapons (ICAs) and Riot Control Agents (RCAs). Chapters 2 and 3 are used to examine the varying definitions of ICA weapons and RCAs in further detail and to

expose the narrative inconsistencies that emerge in global dialogue surrounding their production/proliferation/usage. While laying the necessary foundational framework, the author draws the readers' attention to the various issues and complexities that surround this discourse globally, such as the "creeping legitimization of ICA weapons as the norm"<sup>3</sup>. He also demonstrates the dangers of State research into militarizing chemical weapons that could culminate in Chemical warfare. Dr. Crowley also exhibits the increasing confluence of rapidly advancing science and technology and the dangers of militarized chemical manipulation that could negatively impact genomics, synthetic biology, medical pharmacology, and neuroscience. He also draws attention to the fine line between the usage of RCAs as mechanisms of control and their rampant misuse as a means of perpetuating autocratic domination.

Chapter 4 deals with the means of delivering and dispersing Riot Control agents which are divided into "limited area" delivery and "wide area" delivery. Dr. Crowley exhibits the dangers that these mechanisms pose when ungoverned and uncontrolled by an iron clad framework and exposes the grey area they embody with respect to large scale human rights violations and conflict escalation.

The second stage of the HAC analysis begins with chapter 5 and involves an examination of the current protocol - the regulations that are in place to deal with and contain ICA weapons/RCA weapons - and the variant definitions surrounding the usage/proliferation of the same. While there seems to be a sort of consensus surrounding the need to prohibit the usage of RCAs, the reported practices of a small minority of countries such as the US/Turkey could pose potential causes for concern in the future. The open ended interpretability of the CWC

tenets of “law enforcement” activities pose further causes for concern. Chapters 6 and 7 continue this second stage analysis through an examination of current Arms control Agreements such as the Geneva protocol, and the limited scope of the agents that it covers. The author demonstrates the fact that while the protocol encompasses a wide variety of agents and can be extended to include RCAs as well, the limitations that are posed in its tenets are limitations of ‘usage’. Dr. Crowley states that “the Protocol does not address the development, production, transfer or stockpiling of such agents”<sup>4</sup> The same problem of limited scope emerges in the author’s examination of the Biological and Toxin Weapons Convention (BTWC). Because of the prohibitions of use placed by the Geneva Protocol, Article I of the BTWC does not *explicitly* ban the usage of such weapons but functions by *implicit associative* bans on development and stockpiling.

The author continues this stage II analysis of current protocol by examining the limited applicability of legal frameworks such as International Humanitarian Law (IHL), International Human Rights Law (IHRL), and International Criminal Law on ICA weapons/RCAs. The IHL provides an important framework within which to monitor ICA weapons/RCAs but it is limited to enforceability solely in a state of war/conflict. The three loopholes that the author identifies are that

- a) The IHL’s enforcement/investigative procedures can only be initiated by High Contracting Parties,
- b) The review process remains undefined and therefore the number of states involved in the review and the nature/result of the review process remains unknown.

- c) This body of law is only applicable in situations of armed conflict and therefore ICA weapons/RCAs developed for law enforcement would not fall into this category.

The problems with IHRL stem from the lack of a framework of applicability with respect to chemical weapon proliferation. The monitoring and enforcement activities serve as postdated mechanisms that can be placed *after* a violation has taken place, and furthermore “there are no internationally accepted procedures under IHRL for evaluating new RCA and ICA weapons or monitoring their subsequent usage at a national level.”<sup>5</sup>

Chapter 10 carries this investigation of current protocol forward and examines the means that can be used to regulate/control the transfer of ICA Weapons/RCAs through treaties, embargoes and various other plurilateral mechanisms of control. The author uses the examples of the UN and EU arms embargoes and examines the efficacy of the same. Chapter 11 examines the application of the UN Drug Control Conventions to ICA weapons. The author draws the readers’ attention to the “Single Convention on Narcotic Drugs (SCND) and the UN Convention on Psychotropic Substances (CPS)”<sup>6</sup>. While they serve as excellent potential mechanisms, direct applicability of the same remains a problem due as they were originally developed as crime control instruments. The author believes that further research on these two agreements could help create a more structured HAC wherein the containment policies effected by these two agreements could be extended towards an arms control treaty as well.

Chapter 12 deals with the role of Civil Society in combating the misuse of ICA weapons and RCAs and the role played by “social

verification" in controlling/containing the same. The author demonstrates the need for a "culture of responsibility" amongst the medical/scientific communities and the accompanying, intrinsic need for accountability in these disciplines. Dr. Crowley believes that the establishment of any HAC would necessitate the involvement of Civil Society as an active and responsible observer and enforcer of containment mechanisms. The success of such an endeavour would be deeply dependent on a confluence of efforts on behalf of the individual, the medical/scientific communities as well as governments across the world.

<sup>3</sup> Crowley, 2016

<sup>4</sup> Crowley, 2016

<sup>5</sup> Crowley, 2016

<sup>6</sup> Crowley, 2016

Chapter 13 serves as a conclusion wherein the author provides certain policy recommendations on the basis of which a relatively efficient HAC may be implemented. Some suggestions provided are the introduction and affirmation of restrictive practices with respect to RCA/ICA weapons usage and proliferation, initiating discussion mechanisms to provide recommendations to OPCW organs on ambiguous issues, clarifications of terms and interpretations and institution of reporting and transparency mechanisms. The author concludes by stating the need for collaborative effort across institutions, governments and communities and the need to implement and elaborate on existing frameworks while also creating new ones to avoid the looming spectre of a chemical apocalypse.

## Endnotes:

<sup>1</sup> Crowley, 2016

<sup>2</sup> Crowley, 2016

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