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रक्षा अध्ययन एवं विश्लेषण संस्थान

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Editorial

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In the year 2019 the debates and deliberations on Biological Warfare have regained traction because of two reasons first, it marks the 47th anniversary of the Biological Weapon Convention that has prevented one of the most inhuman forms of warfare known to humanity. Second Matthew Meselson, an American biologist received 50,000 USD Future of Life Award for spearheading the fight for an international ban on biological warfare. He has also pushed for a stronger agreement as the Geneva Protocol only banned the use of biological weapons and not their stockpiling or research, and in 1972 got the Biological Weapons Convention in place.

Meselson's efforts suggest that there has always been cognizance around the world regarding the need to have stringent policies in place to counter the grave threat of biological and chemical weapons. In this context, Daniel M. Gerstein writes about the growing concern regarding an evident indifference to the support of the long-standing institution and how they have been ineffective to address the key issues and their inadequacy regarding global preparedness and response capabilities.

Shambhavi Naik in her article underscores the salience of development in technologies that have lowered the barriers of designing new bioweapons and resurrected the threat of biowarfare. Further, the relation between biological weapons and health security is brought forth in the article written by Vasudevan Tripathi.

This issue also comprises other features like the Kaleidoscope, Opinion, Book Review and Chemical and Biological News. With our readers' feedback, we wish to publish issues in the future that focuses on a subject of particular concern. Contributions and feedback are welcome and can be addressed to: cbwmagazineeditor@gmail.com.

Time to Bolster Global Biological and Chemical Defense Capabilities

Daniel M Gerstein

Daniel M Gerstein works at the RAND Corporation and is an adjunct professor at American University. He was the undersecretary (acting) and deputy undersecretary in the Science and Technology Directorate of the Department of Homeland Security from 2011-2014.

Summary

Recent biological and chemical trends highlights a growing concern regarding an evident indifference with respect to the support of the long standing institution CWC and BWC. This can be attributed to three causes the lowering of thresholds for developing BW and using CW, the demonstrated international lack of will to support these key international institutions, and a questionable ability to deal with the types of mass casualty scenarios as a result of biological or chemical attack. Today, the global preparedness and response capabilities are seen to be inadequate to address the range of biological and chemical threats the world is facing.

The 1972 Biological Weapons Convention (BWC)¹ and 1993 Chemical Weapons Convention² (CWC) serve as the norms against the use of biological and chemical weapons, respectively. However, recent biological and chemical trends should be cause for concern about a growing indifference to respect for and support of these institutions.

Specifically, three indicators combine to suggest cause for concern regarding biological weapons (BW) and chemical weapons (CW): the lowering of thresholds for developing BW and using CW, the demonstrated international lack of will to support these key international institutions, and a questionable ability to deal with the types of mass casualty scenarios that could result from a biological or chemical attack or even an accident or naturally occurring disease outbreak.

Since the BWC entered into force in 1975, advances in biotechnology³ for use in the pharmaceutical, medical and agricultural industries have led to the rapid corresponding proliferation of knowledge and equipment across the globe. With growing interest in using biotechnology for other industrial uses such as bio-fabrication, bio-electronics, bio-sensors and even digital organisms and environmental remediation, the biotechnology industry undoubtedly continues to grow.

This proliferation implies that more nations and individuals will have access to dual-use biotechnology that could be used for industrial purposes, economic development, and curing disease or alternatively can be misused for malicious purposes or causing accidents. The deskilling of technologies will translate to increasingly more sophisticated biotech in the hands of a greater number of

people, less education and skill required to use increasing this equipment and tools, and at lower costs for using these capabilities. In short, the thresholds for use of the technology will be dramatically lowered.

For chemical weapons, the thresholds are lowered based on the recent increased use of these weapons. Prior to the CWC entered into force in 1997, major chemical weapons uses⁴ were seen in World War I, World War II, southeast Asia by Vietnamese forces, Yemen by Egyptian forces, and the Iran-Iraq war to name a few. Casualties totaled over two million people killed. When the CWC entered into force, for the five-year period from 1997-2002, no chemical incidents were reported. However, since, we have seen an increased willingness by states and terrorists to use chemical weapons on the battlefield, against populations and for assassinations.

The government of Syria and the Islamic state used chemical weapons and toxic industrial chemicals during hostilities and against populations. Two high profile assassinations demonstrate a callous indifference by states to violate the CWC. The successful assassination of Kim Jong Un's half-brother in a Malaysian airport with a binary VX nerve agent and the recent attempted assassination of a former Russian spy and his daughter, Sergei Skripal and his daughter Yulia with a novel Novichok or N-series nerve agent signal demonstrate a disregard for international norms and an inability to be deterred. In the case of the alleged Russian attack, the novel agent use was likely a deliberate message designed to signal what happens to those that cross the Russian government and Vladimir Putin. The world has watched as redlines

have been drawn yet little more than symbolic actions have been taken. In these recent uses of chemical weapons since 2002, the total number of killed has been approximately 5,000, with at least the same number of people injured.

While we have witnessed this lowering of thresholds through the proliferation of biotechnology and the use of chemicals as tools of war and against populations, we have also witnessed a lack of international will to support key international institutions. The results of the most recent review BWC and CWC conferences—which are held every five years and serve as major forums for respective convention decision making—have been less than encouraging.

At the BWC's Eighth Review Conference held in November 2016, the final document⁵ fell short of expectations. It was generally looked at as a missed opportunity⁶ to address the pressing issues surrounding the effects of biotechnological change on the BWC. In addition, it saw a fractured debate led by the Non-Aligned Movement (NAM) calling for a return to the negotiation of a BWC protocol—a verification protocol—for assessing compliance. Such a proposal would be a non-starter for the United States and several other nations that question whether verification of the BWC is possible given its dual-use nature. While many ideas were floated on topics such as export controls, and matching lists for donor and recipient nations for capacity building, in the end, there was little consensus on a way forward. Even the workplan for the intersessional work program—that many hoped would result in an ambitious effort leading up to the 2021 Ninth Review Conference—fell short. With the end of the Eighth Review Conference, it became clear that no tangible results on the major substantive issues of the day had been achieved.

As a postscript, at the recent 2018 BWC Meeting of States Parties, the fractious debate continued. The only tangible outcome was the establishment of a working capital funding for nations to provide voluntary funding and which could serve as a source of support to fulfill short-term funding needs.

The CWC's Fourth Review Conference held in November 2018 also failed to live up to expectations. The forum failed to arrive at a consensus document⁷ and therefore the chair of the review conference issued a summary of the proceedings which essentially described the discussions but did not present final outcomes and conclusions. The major sticking point was as the UK representative noted, "A very small minority who have used, or defended those that use, chemical weapons have obstructed our efforts." In short, the CWC outcome was politicized, hindering attempts to bring perpetrators of chemical attacks to account for their misdeeds.

As one account of the CWC Review Conference noted trying to find some positive outcome, "While the ultimate failure of the review conference to agree to final document sends a negative political signal, the conference of states parties' success in taking forward funds for attribution to hold chemical weapons users accountable is a notable gain for the CWC and the global norm against chemical weapons use."

Still, failure to deal with the key issues of the day and make progress towards biological and chemical issues provides ominous warning signs for

both conventions. Either of the review conferences saw a majority of nations supporting many of the substantive mainstream resolutions, but the decision-making mechanisms requiring consensus limited significant forward movement on major issues.

Finally, progress on global preparedness and response has been seen as a result of efforts by the World Health Organization (WHO) and related Food and Agriculture Organization of the United Nations (FAO) and World Organization for Animal Health (OIE); through the Global Health Security Agenda (GHSA) program; and the support of individual nations on a bilateral basis. However, recent events including the two most recent Ebola outbreaks in West Africa from 2014-2016 and currently ongoing in the Democratic Republic of the Congo, and the African Swine Fever pandemic spreading throughout Asia and Europe demonstrate how far we have to go. One can see clearly a lack of preparedness and response capabilities in areas such as biosurveillance, diagnostics, vaccines and therapeutics, international collaboration and crisis communications.

Despite the lessons China learned about crisis communications during the Severe acute respiratory Syndrome (SARS) virus in 2003, concerns exist about the reporting and transparency by China regarding African Swine fever.⁸ Without accurate sharing of information, biosurveillance is spotty and likely, not accurate. Therapeutics including vaccine development continues to be elusive for many emerging diseases. For example, the therapeutic for Ebola, ZMapp, that is, the monoclonal antibody combination treatment⁹ used in the West Africa outbreak is still continuing to undergo testing. Despite calls for more rapid development, therapeutics still take over a decade to gain full licensure. Meanwhile, unproductive

discussions about how and under what conditions to share biological and chemical defense capabilities globally as part of the BWC and CWC continue with little progress.

While the BWC and CWC remain important forums for dialogue on biological and chemical issues, recent history suggests that the norms against the use of these weapons have eroded and that thresholds against further use have been lowered. Meanwhile, global preparedness and response capabilities have also been seen to be inadequate to address the range of biological and chemical threats—both deliberate and naturally occurring—the world is facing.

Endnotes:

¹ Text of Biological Weapons Convention, *US Department of State*, see <https://www.state.gov/t/isn/bw/c48738.htm>

² The Chemical Weapons Convention, *SIPRI*, April 1997, see <https://www.state.gov/t/isn/bw/c48738.htm>

³ Srinibas Kumar, "Biotechnology: Scope and Branches of Biotechnology," *Biology Discussion*, see <http://www.biologydiscussion.com/biotechnology/branches-biotechnology/biotechnology-scope-and-branches-of-biotechnology/15653>

⁴ Wm. Robert Johnston, "Summary of historical attacks using chemical or biological weapons," *Johnston's Archive*, December 2017, see <http://www.johnstonsarchive.net/terrorism/chembioattacks.html>

⁵ Jenifer Mackby, "Disputes Mire BWC Review Conference," *Arms Control Association*, February 2017, see https://www.armscontrol.org/ACT/2017_01/News/Disputes-Mire-BWC-Review-Conference

⁶ *Ibid.*

⁷ Alicia Sanders Zakre, "Covering the CWC Conference of States Parties and 4th Review Conference," *Arms Control Association*, December 2018, see <https://www.armscontrol.org/blog/2018/covering-cwc>

⁸ Adam Minter, "China's Pig Pandemic Should Worry Everyone," *Bloomberg Opinion*, April 2019, see <https://www.bloomberg.com/opinion/articles/2019-04-24/china-s-handling-of-swine-fever-outbreak-similar-to-sars>

⁹ Kevin Kunzmann, "Investigative Ebola Treatment ZMapp to Undergo Testing," *MD Magazine*, February 2018, see <https://www.mdmag.com/medical-news/investigative-ebola-treatment-zmapp-to-undergo-testing>

United States Bio-surveillance Project in South Korea: A conflict between Traditional and Non-Traditional Security

Vasudevan Mani Tripathi

Vasudevan Mani Tripathi is a post-graduate scholar from the University of Allahabad in Defence and Strategic Studies. He is also associated with the Centre for Military Affairs at IDSA.

Summary

The Bio-surveillance project of the United States in South Korea is facing a serious criticism as it is believed to be a threat to the safety and survival of the local population of South Korea. While both the United States as well as South Korea denies the allegations, and they fail to provide complete information on the issue in the name of so-called 'national security issue'. The article brings out the contradiction between traditional and non-traditional security approach by putting the United States Bio-surveillance Project in South Korea as a case in point.

The Twenty-first century security environment is highly uncertain. The changing security paradigm has deepened and broadened the concept to a large extent. On the one hand, the traditional notion of security has maintained its importance and states are not ready to sacrifice their vital interest at any cost. On the other, there has been an increased acknowledgement of non-traditional security concerns, not only by states but also by various non-state actors. This has created a contradiction of its own, as both the approaches confront each other and it becomes hard to decide the priorities among traditional and non-traditional security issues for taking up certain actions needed at a particular time.

The 1994 UNDP Report while introducing the concept of Human Security had identified the seven areas from which the major threats to the security of an individual emerges. These areas are- Food insecurity, Environment insecurity, Personal insecurity, Community insecurity, Health insecurity, Economic insecurity, Political insecurity.

It is to be mentioned here that *Securitization Theory* explains how a particular issue is being securitized by the state with the help of a two-stage model.¹ However, the critics of securitization theory argue that it may be possible that almost every issue can be securitized like this. Thus, when every issue becomes a security issue, it becomes very difficult with limited resources to prioritize the sectors which really need extraordinary attention.

Chemical and Biological Warfare

Chemical and Biological Weapons have been the weapons of mass destruction since early times. Various types of chemicals and bacteria, pathogens, viruses etc are

deliberately used to cause mass destruction to humans, animals and plants. It is widely acknowledged that these weapons not only pose a serious indirect threat to the state but also a big concern directly to the individual well-being. Thus, Health Security in this respect is an issue that can't be ignored altogether and must be taken care of.

It is seen that since early times traditional security notions and structures have been used by major powers of the west for their own interest. In the name of threats to national security, often th

ey are seen to use the smaller states for various activities like maintaining of bases, conducting various types of tests, etc. The United States led bio-surveillance project in one of the far-east countries, South Korea is a live example of this fact.

JUPITR ATD Project and Busan's public concern

The Project was launched by the United States in April 2013 in support of US policies recognizing the importance of detection capabilities to guard against biological and chemical threats. It is named as JUPITR ATD acronym for "Joint United States Forces Korea Portal and Integrated Threat Recognition Advanced Technology Demonstration"²

Initially, JUPITR's aim was the development of early-warning detection capabilities to protect the US Forces Korea (USFK) and South Korea from biological and chemical threats. From 2015 onwards, it has been criticized continuously by the residents of Busan in South Korea. It is because in May 2015, the Pentagon confirmed that its laboratory in Utah had inadvertently sent live anthrax samples to one of its military bases in South Korea, rather than the inactivated samples that were meant to be

delivered for the project.³ The live samples were so dangerous that that even without war, they can be a great threat to the people around.

Every morning, dozens of residents and activists gather to block the entrance to the Pier 8 where the US operates a bio-surveillance project in Busan's Nam district, to stop the US soldiers from going to work. At night they hold candlelight vigils, carrying signs that read, "Nam district residents are not test subjects for viruses" and "Abolish the biological weapons test lab."⁴

On the other hand, the USFK has denied all the allegations that it is conducting biological tests using hazardous materials such as live agents or toxins. The Korea Herald came up with the statement of the leader of a regional civil task force who is calling for an end to the biological weapons lab and goes on to question the motives of United States as to why can't the country conduct these tests on their own soil.⁵

Bio-surveillance has been a national priority of United States since 2007, when the Homeland Security Presidential Directive-21 formalized the policy that all hazards threats could take many forms, including naturally occurring disease outbreaks. The National Strategy for Bio-surveillance was established in 2012, and while some organizations have begun moving on the initiative, there are still a number of questions on how to best implement bio-surveillance.⁶

The Busan's bio-surveillance is an ongoing project that is meant for defending against biological threats. According to Peter Emanuel, the leader of JUPITRATD in 2013, project was seen as the Pentagon's, flagship project⁷ which was led by the US Joint Program Executive Office for Chemical and Biological Defense and the US Army

Research, Development and Engineering Command's Edgewood Chemical Biological Center. It is a comprehensive surveillance and reaction system to provide protection and early warning in case of any biological and chemical threats. It is made up of four parts: Early Warning, Biological Identification Capabilities Sets, Assessment of Environment Detectors and a Bio-surveillance Portal.

Conclusion

The ongoing debate between traditional and non-traditional security is practically applicable in this case. On one hand, it is argued by the state and security machinery that the project is necessary and it will make the defence stronger and would enhance its capability to a large extent. The United States and South Korea deny providing complete information in this regard by labeling it a security issue. On the other hand, the project is not acceptable to the common people, who look into it with great suspicion. The use of live-anthrax samples in the test lab was highly objectionable, which, even if by, spreads out, would wreak havoc to the area not only in South Korea but other adjoining regions as well.

This issue has yet not gained the required traction. This incident also underscores the salience of states supremacy in decision making. The present scenario where the international debates are revolving around several newer concepts like human security comprising of various elements as mentioned above, this type of incidents puts a question mark on the concepts and their practical applicability. Today, while there are a number of non-state actors like International Organizations, NGOs, etc working for the people of the world, at the same time the superior states are still under their narrow minded security perspective. The smaller states many a times fall under the trap of

bigger states in their doing. The present example is one of them. The primary duty of any state is to look after the security and safety of citizens and their well-being. And if the state fails to perform its duty or undermines it, it becomes the duty of international community to look after grievances of the people in every part of the world, wherever the need comes. The question still arises- *Who is important, State- as an entity or the people at large?*

Endnotes:

¹ Emmers, Ralf. "Securitization" in Alan Collins, ed., *Contemporary Security Studies*, Fifth Edition (Oxford, New York: Oxford University Press, 2018).

Two- Stage model of Securitization explains how a particular issue in ordinary domain becomes so important to put it on the list of highly important and sensitive issues. The first stage is Politicization and the second stage is Securitization. In the first stage, the issue is discussed in the public domain by various important persons like politicians, bureaucrats etc through the speech act to increase the importance of the issue. Then, if the audience is convinced, the issue is securitized where extraordinary measures are taken then to deal with it.

² Jo He-rim, "[Feature] Fear of Biological Agent Strikes Busan as US Troops Continue Biosurveillance Project • Pacific EPeak," April 15, 2019, <https://pacific.epeak.in/2019/04/15/feature-fear-of-biological-agent-strikes-busan-as-us-troops-continue-biosurveillance-project/>.

³ Ibid.

⁴ See note 2.

⁵ See note 2.

⁶ "U.S. Army JUPITR Project to Develop Biosurveillance Capabilities on Korean Peninsula," *Aberdeen, MD Patch* (blog), April 11, 2013, see <https://patch.com/maryland/aberdeen/bp-us-army-jupitr-project-to-develop-biosurveillancec2ddcf99f1>.

⁷ He-rim, "[Feature] Fear of Biological Agent Strikes Busan as US Troops Continue Biosurveillance Project • Pacific EPeak."

Agro-Warfare: Attack on Crops and Livestock

Tanvi Kaur

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Summary

One of the chief consequences of the world wars was the development of better and sophisticated weapon systems. It signified a transition from traditional to non-conventional means of warfare that included biological weapons (BW). These weapons are varied kinds and can also constitute the development of anti-crop agent which can trigger a famine across the country and the intentional outbreak of animal diseases to target the livestock of the nation. These attacks have a long term effect on the economy and health of the population. With weapons aiming to destroy the long term sustainability of a country, the need to enhance the security mechanisms, to mitigate their use becomes inevitable.

The outbreak of two dreadful world wars led to the emergence of the need to develop better and sophisticated weapon systems to defeat the enemy. On both sides of the battleground, innovations led to the creation of deadly and destructive forces, which reinforced the imminence of the end of humanity. This was further exacerbated with America dropping nuclear bombs on Japanese cities of Hiroshima and Nagasaki. This incident, alone, was a foremost and significant step in an apparent shift from the use of traditional means of warfare to non-conventional means of warfare. The concept of "weapons of mass destruction" comprising of nuclear, chemical and biological weapons witnessed an expansion. With numerous advances being made in the development of such weapons presently, the threat of them being employed in case of warfare has become imminent.

Conceptualizing Germ-Warfare

Biological weapons have been in use since the time of the Romans, to spread diseases, incapacitate or destroy the enemy population, crops as well as their livestock.¹ However, their use and its potential to cause harm have been hidden from the public eye. With the recent developments in science and biotechnology, a valuable contribution have been made to the production of biological weapons, which begets the need to understand their use and the potential harm they pose in the future.

Biological Weapons can be described as "micro-organisms that infect and grow in the target host, producing a clinical disease that kills or incapacitates the target. Such microbes may be natural, wild-type strains or may be the result of genetically engineered organisms."² These viruses can spread via water, air and soil. It also includes germ

warfare as well as entomological warfare. According to the U.S. government, biological warfare is "the intentional cultivation or production of pathogenic bacteria, fungi, viruses... and their toxic products, as well as certain chemical compounds, for the purpose of producing disease or death." ³

Biological weapons differ from conventional weapons in all aspects. First, the pathogens used are highly infectious and do not distinguish between self-forces and non-self-forces. Moreover, these weapons require only a small number to produce in large quantities. They differ from other nuclear and chemical weapons. It is a cumbersome and time-consuming task to detect the release of a virus. This is because the virus requires an incubation period before its effects can be seen on the victims. This works to the advantage of the aggressor to remain undetected, as no effects are immediately observed. There are chances of it being considered as a natural outbreak, thus, concealing the attacker. Moreover, biological weapons are economical to manufacture, as compared to nuclear and chemical weapons. As it can be easily employed by weaker nations and terrorist organizations who lack the capability to produce nuclear weapons, thus, being called "the poor man's weapon of mass destruction." ⁴ And they pose a threat, if not greater but equal to chemical and nuclear weapons. Thus, "a country lacking the technological know-how to produce atomic bombs can still make weapons that could set off devastating famines or economic losses."⁵

At the same time, there are a number of disadvantages associated with production and use of biological weapons, such as the probability of spread of virus, disease, bacteria among the populations of the attacker nation, in the process of developing it. Global warming and the inter-connectivity among nations increases the difficulty to

contain the spread of such contagious virus. There are, also, issues related to the effective spread of such bacteria, for example, agents in the form of spores released for contaminating the crops might be affected by wind patterns or rainfall. Thus, hampering the efficiency, and to maintain the same, biological agents need to be stored in a special facility.

Since ancient times, various forms of biological means of warfare have been employed to counter the enemy like the practice of poisoning water bodies in the enemy area. In addition to this, there was the practice of spreading contagious diseases such as smallpox and bubonic plague in the enemy grounds, through dead bodies of the infected victims. This was witnessed in 1346 when the Tartar troops hurled the bodies of plague victims in the city of Kaffa to kill large masses of people. To counter the Delaware Indians, in 1763 the English soldiers famously traded blankets of smallpox and measles victims with them. ⁶ During the Second World War, the Japanese employed the strategy of germ warfare against China, in the form of contaminated food and plague-infected bombs. Starvation was another method used as a form of indirect biological warfare, during the Second World War, by the Nazis against the Jews. In 2001, in the Amerithrax case, anthrax-poisoned letters were delivered to media houses and senators, killing five people. ⁷ Along with these, the future threat of biological weapons being aimed at crops and livestock have become a dangerous potential.

Anti-Crop Warfare

Development of biological weapons, for the purpose of damaging the crops, could be traced back to British, French, German and Japanese efforts to develop herbicides, especially during the Second World War. Its earliest use can be found in Malaya against

the communist forces by the British in the 1950s.⁸ This was further utilized by the Americans to deploy the herbicide agent Orange on a large scale in Vietnam in the 1960s to reduce the dense forest cover, which resulted in visible destruction of the environment and affected the lives of the Vietnamese people as well as the American troops stationed there. It led to the formation of the international treaty of Environmental Modification Convention (ENMOD), which entered into force in 1978. It prohibits the use of hostile military weapons for the purpose of environmental modification. It does not directly enforce a ban on the use of herbicides.⁹

However, the 1960s witnessed a consistent pursuit of the biological weapons programme, especially by the two power blocs namely, the US and the Soviet Union. In recent years, the anxiety with regard to biological weapons peaked with the possession of weapons of destruction, by Iraq in the 1980s, dealing with bioweapons like anthrax and various types of toxins. Apart from this, there have been claims that Iraq was developing a herbicide called wheat smut fungus.¹⁰

There are numerous varieties of a crop, which are suitable to a particular set of climate, soil and are sensitive to certain viruses. These 'crop pathogens' are tailored to take advantage of these properties by isolating them and developing weapons, like bombs, targeting the particular crop. The pathogens are easily spread among plants in the form of spores. This destruction of crops has a strained effect on the economy of the country. For example, this can be observed from the natural outbreak of crop diseases like the spread of leaf blight (plant disease) in America in the 1970s, which destroyed crops amounting to 1 million USD. Coffee leaf rust in the 19th century destroyed numerous coffee plantations in Southeast Asia. The

spread of famine in Bengal in 1942-43 could be attributed to the spread of brown spot disease in the rice crop, which led to the starvation of two million people.¹¹

Such a kind of warfare can be highly detrimental for developing and undeveloped nations which depend on one crop as its staple food sources, such as rice or wheat. The damage caused by an anti-crop agent can trigger famine across the country, leading to extreme starvation and malnutrition. At the same time, resulting in a reduced resistance against diseases, among the population. This kind of attack, thus, proves to be equally destructive, just like a conventional military attack. And damaging more so, with a long term effect on the economy and health of the population.

Since the 1980s and continuing in 2000s, the US Congress has approved a bill based on anti-drug program worth 23 million USD, targeting the drug plants like cocaine, marijuana and heroin through 'plant pathogens'. This violates the BTWC (Biological Toxin Weapons Convention), however, it has been proposed that it shall be used in cooperation with drugs-producing states. This program has also been opposed on the ground that it might spread to other plants, might be used without the consent of drug producing states and most importantly, it can provide practical knowledge to further develop "aggressive, offensive biological warfare targeting food crops."¹²

Beginning in 2014, Israel has been spraying highly concentrated harmful herbicides along the Gaza Strip which houses the farms of multiple Palestinians.¹³ These herbicides have resulted in a massive amount of crop damages as well as exposure to numerous health risks like cancer. It also affects the crops on the Israeli side of the border. This has been amounting to a violation of international law and a number of

Palestinian-based groups are demanding accountability and compensation for these losses, but it has been to no avail.¹⁴ This was started after the 2014 conflict with Israel, wherein they destroyed the Palestinian agricultural experiment station as well, which was vital for Palestine to achieve self-sufficiency in agriculture.

According to the United Nations, more than 10 crop diseases have been identified which has the potential to be converted into a weapon, internationally. The crops which are high at risk include wheat, rice, corn, sugarcane, potatoes, coffee and different kinds of fruits, etc. Thus, anti-crop weapons can have a drastic impact on the economy, making their prevention a critical issue in the international community.

Presently, there is a Biological and Toxin Weapons Convention (BTWC -1972) in place, which needs to be strengthened. Simultaneously, there is a requirement of an organization similar to IAEA (International Atomic Energy Agency) to keep a check on the development, possession and use of biological weapons by the countries. However, the political interests of states and economic interests of the corporates have faltered these efforts. Thus, leading to "creation of a devastating range of new weaponry, some of which is certain to be aimed at the food crops that feed billions of the world's citizens."¹⁵

Warfare against Livestock

Apart from harming the crops, the intentional outbreak of animal diseases is another weapon which has the capacity to reduce drastically, if not completely, the food supplies. Livestock has also been a vital target wherein highly infectious diseases like viral mycotic infection, encephalitis, rinderpest, foot-mouth-disease (FMD), African swine fever, tularemia are prominent. There has

not been an incident of livestock attack, however, the probability of the same is quite high. It presents itself in the form of a direct attack on the targeted nation's food supplies and the economy. It can be employed by a weak nation against a highly developed nation in the process of uneven warfare.

With numerous changes in the livestock industry over the years, its transformation from a "highly localized industry" to a "geographically dispersed industry", has taken place. Thus, the constant movement of animals makes it easier for a terrorist to plant an attack in the form of a virus in a few strategic locations. The swine flu epidemic in the Netherlands in 1997 is a prime example of the spread of disease due to the movement of people. Additionally, the 2007 outbreak of FMD in Britain resulted in the establishment of control zones to restrict the movement of animals in order to prevent the spread of disease.¹⁶

It is difficult to ascertain the harm caused to the economy of a country, due to the spread of such diseases. Considering a hypothetical scenario of a breakout of contagious livestock disease in America, which is the largest exporter of beef and pork in the world, the export markets would drastically collapse and rupture the American economy. The 2001 FMD attack in Britain cost the country a loss worth of 6 million USD from "livestock death, slaughter, carcass disposal, environmental protection, quarantine, custom searches, loss of market value, and lost tourism."¹⁷

FMD is a deadly disease, as it affects the animals greatly and causes their death in large numbers, bearing unprecedented loss in the form of decreased milk and meat production. Earlier Denmark was the leading exporter of pork to Japan, however, after the outbreak of FMD in 1982 in Denmark, Taiwan became the largest pork exporter to

Japan. However, after the FMD outbreak in Taiwan in 1997, there was a loss of 40% of the pig population, thus, causing a dramatic fall in demand for pork. Soon, America took over the title of the largest pork supplier to Japan.¹⁸ Thus, it can be observed that FMD negatively affected the economies of Denmark and Taiwan.

These viruses are quite dangerous as they do not need any specific means to be transmitted, as they can easily spread from one animal to the other. At the same time, the attacker, need not require any specialised training to obtain the diseased pathogens or to transmit it among a large number of animals. With the spread of the disease through natural means of contact between the infected animal and other animals, the terrorists witness a growth in their arsenal, without much hassle. And unlike anti-crop agents, the attacker need not protect their own human populations against the virus, as “many of the most economically devastating livestock diseases do not infect humans”¹⁹. However, the possibilities of the virus being developed to affect the human population are being considered, for the purpose of research in human immunization.

The Way Forward

There is an urgent need to find proper ways to mitigate and prevent the use of such weapons. For this, an in-depth awareness and understanding of their potential are required. Advances like the development of a neutron bomb in the Cold War days was proposed to destroy all forms of life, without damaging the surrounding infrastructure or the inception of the secret South African biological and chemical warfare programme Project Coast, wherein the plan to embed the weapons with certain gene types to target a particular population, has been considered. These developments reinforce the need to enhance security mechanisms.²⁰

As mentioned above, along with the strengthening of BTWC, there is an imminent need for an organization to enforce verification on the development of biological weapons across the countries. At the same time, sharing of intelligence of possible bioterrorist attack can contribute towards early detection. Early detection helps in reducing the impact of the disease, especially in terms of livestock wherein the infected animals are isolated, so as to prevent further transmission of diseases.²¹

At the domestic and regional level, there should be the expansion of services which facilitate early detection, through adequate funds and staff. At the same time, development and stockpiling of vaccination for animals and pesticides for crops, which make them resistant to various diseases, is the need of the hour. Along with this, comprehensive planning and consensus in developing a list of major threats from biological weapons, across the globe, is a vital requirement. Various “strategies and technologies” to handle such an outbreak needs to be devised by the respective governments, domestically as well as internationally.²² At the same time, various health professionals like doctors, nurses, veterinarians, microbiologists need to be trained to recognize the spread of a deliberate outbreak and respond quickly.²³

The vulnerability to such weapons shall exist, however, with efficient response, the extent of damage can be reduced if not completely eliminated. Thus, BW is clearly lies in the category of mass destructive that does not necessarily include injuries to people but can threaten economy through damage to livestock or crops as well.

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Biological Weapons: The Impact of New Technologies

Shambhavi Naik

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Summary

Bioweapons have often remained a less debated subject in global dialogue as compared to other weapons of mass destruction. However, the recent development in technologies have lowered the barriers of designing new bioweapons and resurrected the threat of biowarfare. This has culminated in increasing recognition of such weapons in the global intelligence community and a review of existing regulations to ensure one remains updated to tackle with the renewed biological weapons threat. India is also vulnerable to biological attacks given the poor primary healthcare network, conducive environment and conflicting relations with neighbouring countries.

In June 2018, German police arrested a Tunisian man in Cologne for trying to build a biological weapon using the deadly toxin, ricin.¹ In October 2018, researchers flagged a US agricultural program funded by DARPA (Defense Advanced Research Projects Agency) as a potential mask for a bioweapons project.² At the same time, Russia also claimed that the US had tested biological weapons in Georgia killing over 70 people.³ Further, suspect packages were sent to select targets in the United States in October 2018;⁴ these packages in addition to being mail bombs also carried a white powder reprising concerns of the anthrax attacks from 2001 which led to the death of 5 people.

There has been no incident of biological agents being used as a weapon of mass destruction in the recent past. Yet as the above examples show, there have been attempts to explore and create technologies that could be weaponised by both state and non-state actors. The threat was made apparent by James Clapper, US Director of National Intelligence, who added gene editing in their annual worldwide threat assessment report in 2016.⁵ Since then, there has been a wider recognition that the advances in technologies and improved access to science have lowered the barriers to creating designer bioweapons.

New technologies and Bioweapons⁶:

Gene editing using the recently discovered CRISPR/Cas system allows precise editing at a relatively cheaper rate without any high-cost expert training. It is important to note that before gene editing if any bioterrorist wanted to use a pathogen, he/she would have to obtain the pathogen from a restricted source. In many cases of bioweapons use, such as the one in Oregon where followers of Osho Rajneesh, intentionally poisoned

civilians using Salmonella, these pathogens are obtained from scientific laboratories which hold these microbes for research purposes.⁷ Over the past many decades, the instillation of Good Lab Practices and Biosafety standards have prevented the accidental release of these agents for malicious purposes. However, with the advances in gene editing techniques, bioterrorists could now use a relatively harmless biological agent and convert it into a more harmful agent. For instance, the currently available vaccines that protect against measles render the pathogen ineffective in causing the disease. However, the measles pathogen can be genetically edited such that it is no longer resistant to the vaccine. The resulting pathogen could easily wreak havoc even among a vaccinated population.

Other synthetic biology techniques could also be used to create pathogens without the necessity of getting any organic backbone. In 2002, scientists claimed the creation of the entire polio virus from scratch and the genome sequence was put in the public domain.⁸ While such an endeavour needs scientific expertise and infrastructure, the public revelation of the methodology and genetic sequence certainly lowers the barriers to anyone attempting to design a similar agent. Another development has been the availability of large data sets of scientific knowledge and the AI (Artificial Intelligence)-driven processing powers that can help identify combinations of genes to specifically tailor a bioweapon against a target. Furthermore, as the scientific community shifts towards a more open access policy to make science freely available, the same knowledge could be easily available as well as accessible by terrorists.

There are 3 fundamental ways in which these technologies - either alone or in combination - could change the face of biowarfare:

- 1. Creation of bioweapons that do not impact self forces:** This is exemplified by the vaccine-resistant measles case mentioned earlier. New diseases that one's own forces are protected against can be designed for warfare.
- 2. Creation of agricultural pests:** Similar methodologies can be used to engineer bio-agents against agricultural targets, crippling the economy of the enemy nation or starving their population.
- 3. Creation of tailored weapons:** Using advanced genetic knowledge, bioweapons capable of targeting single individuals or ethnic groups may be created. The use of a bioweapon of this variety may go unnoticed as an intentional attack and state parties may prefer such a weapon to avert large-scale conflict with an enemy state.

The renewed attention towards biological weapons and the relative ease to procure and stock them as compared with traditional weapons of mass destruction may also entice non-state actors into acquiring and using bioweapons.

In the context of this changing scenario of bioweapons use, existing regulations helmed by the Biological Weapons Convention (BWC) are severely inadequate in restraining the proliferation of these new technologies.

Current Status of Biological Weapons Convention

The BWC, which have been in effect since 1975 has been repeatedly criticised for its ambiguous language and more importantly, for the lack of a verification mechanism that can be invoked to check if signatory nations are complying with its mandate. The Convention prevents the creation, use,

stockpiling or exchange of any bioweapon; however, its very definition of “bioweapon” is ambiguous. It allows the stocking of pathogenic agents in small quantities that can be used for peaceful purposes. Scientists, for example, hold small repositories of pathogenic agents to research better diagnostic or therapeutic interventions. However, unlike nuclear or chemical weapons, small repositories of biological agents can be easily scaled up for malicious purposes. This makes identifying the intention behind holding biological agents in any quantity difficult and defeats the purpose of the Convention.

The BWC’s repeated attempts to introduce an effective verification mechanism have failed and as many as 12 countries including Iraq, Iran, Libya, China, Russia, and North Korea, who are parties to the Convention, are often alleged to have an ongoing bioweapons programme.⁹ An incident in Russia revealed that they held on to their exploration bioweapons programme much after ratifying their commitment to the BWC.¹⁰ Notably, Israel is not a signatory to the Convention stoking fears that the nation may be experimenting with bioweapons.¹¹

The 2018 BWC Meeting of Experts held in Geneva in August also noted the implications of gene editing advances to the areas of biowarfare and the need for its regulation.¹² China and Pakistan proposed a voluntary model code of conduct for scientists engaged in using biotechnology. France and India proposed the formation of a database where aid requirements could be matched with specific offers of assistance. But more pertinently, the December BWC review conference brought to notice the dismal funding situation of the BWC but did not reach a consensus on adopting any of the measures suggested by the Experts meeting.¹³

Yet there has not been a significant incident post World War II where bioweapons have been used as a weapon of mass destruction. This success may not be a fall out of the BWC but could be attributed to the nature of bioweapons: they are difficult to control, unreliable and cannot distinguish between self and non-self forces. Further, there was fear of usurpation of the technology by non-state actors. However, with the advent of new technologies discussed earlier, many of these limitations have now been removed. As a consequence, the threat of a bioweapons attack has become very real and India needs to take steps to protect itself from such an attack.

Policy recommendations for India¹⁴

India’s weak primary healthcare system (as stated in a report where the country ranks 145 among 195 countries in healthcare access),¹⁵ conducive environment¹⁶ and hostile relations with neighbouring countries leave India vulnerable to a biological attack. Such an attack might aim at decreasing productivity in India by affecting its people or hampering agriculture or other natural resources such as water. India needs to develop a strong biodefense programme to shield itself against any bio- attack.

1. Surveillance Mechanisms

A primary focus has to be on creating grassroot-level infrastructure and linkages to implement real-time surveillance mechanisms that can rapidly detect a biological outbreak and trigger a swift response from the appropriate authorities. This holds true for both human and agricultural attacks. Improved point-of-care diagnostics will aid in real-time surveillance. A staggered chain of protocols, including quarantine, personal protection equipment for healthcare workers, sample collection and delivery should occur in response to an

infectious outbreak – particularly for those cases where a disease cannot be easily identified.

In many cases, an antibody or specific DNA based tests are used for diagnosis. However, the sequencing of the entire DNA would help identify if the agent has been tampered with using artificial agents. Though this is not always reliable, treating unusual cases as a likely bioweapons attack and documenting genome sequences of the biological agent would provide a repository that could lend useful information for future use.

2. Biosafety Standards, Ethics, and Penalties

The adoption of biosafety standards in all academic and private laboratories and its enforcement through the instillation of penalties for violations will reduce accidental leakages of biological agents from authorised laboratories. The inclusion of ethics in school and college level curriculum, as well as orientation of new hires in laboratories, is essential to educate about the responsibility of the individual researcher with respect to the biological material they are using.

3. Leader at the Biological Weapons Convention

India needs to take a leadership position at the BWC and facilitate the inclusion of the following:

- a. A scientific advisory board: Unlike the Chemical Weapons Convention, the BWC does not have a scientific advisory board to advise on new trends in biotechnology and ways to counter the new age bioweapons. The formation of such a board would aid the Convention to make pragmatic decisions to prevent the proliferation of bioweapons.
- b. Funding issues: Lack of funding and infrastructure has long ailed the BWC.

The implementation support unit of BWC consists of 3 individuals and is sorely under-staffed.¹⁷ India could work with other countries in ensuring the BWC has enough funds to carry out its designated roles.

- c. An alternative to the verification mechanism: While verification is deemed a political non-starter at the BWC, India could partner with other countries for creating a more co-operative mechanism that could be used to transfer important technology for vaccine production or improved vaccine manufacture.
- d. India could also push for transforming the voluntary system for reporting on national activities to a mandatory reporting. The current voluntary confidence-building measures require member parties to voluntarily exchange information on vaccine production plants, biodefence programs, and unusual disease outbreaks. However, this system has seen low active participation; from 1987 to 1995, only 70 of the then 139 member states of the BWC submitted data declarations, and only 11 took part in all rounds of the information exchange.¹⁸ In addition to mandatory reporting, penalties can be put in for parties who are not compliant with the confidence building measures dictated by the BWC. This will help India to gain access to technologies that could improve India's primary health care response.

4. Treaties with Other Nations

Within and outside the BWC, India needs to forge strategic partnerships with countries who can share their expertise on biosecurity.

5. Public Engagement

India needs to embark on a public engagement dialogue to educate its

population about the threat of infectious outbreaks and how to respond in case of any outbreak. An unusual outbreak can easily cause panic amongst people and may aid in spreading the disease as people move away from the epicentre of the attack.

Conclusion

The threat of a bioweapons attack is swiftly being recognised by countries worldwide and India also needs to step up its biodefence programmes. While new technologies may lower barriers of acquiring biological weapons, the renewed attention the topic is getting may itself be sufficient to get non-state actors interested in experimenting with such weapons. Improved access to scientific knowledge, easier control over biological material and reduced cost of creating designer pathogens could entice state and non-state actors to experiment with biological weapons. The current regulatory architecture led by the Biological Weapons Convention may be inadequate to contain this threat and needs to be revisited. India, in particular, needs to focus on national and international measures that can be taken to curtail the threat of bioweapons. A networked primary healthcare system, strong collaboration with other countries and public engagement are central to protecting India from an infectious outbreak – may it be intentional or natural.

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Millions Against Monsanto

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Summary

The article highlights the number of lawsuits filed and the Millions Against Monsanto Campaign, which was started by the Organic Consumers Association (OCA) in the mid-1990s to protest against the hazard induced by Monsanto's products like the Roundup herbicide, which contains glyphosate and is doubted to be carcinogenic.

Alva and Alberta Pilliod, an elderly couple in their late 70s living in California were both diagnosed with non-Hodgkin's lymphoma, Alva in 2011 and Alberta in 2015. The couple has been using the Roundup herbicide for decades and learned about the disease in 2015. The glyphosate chemical present in the herbicide, Roundup, sold by the company Monsanto, was alleged to be carcinogenic by the lawyers of the couple.¹

The jury in Oakland, California ruled in favor of the couple, who filed a lawsuit, determining Monsanto as liable for the damages caused to the health of the couple using their products, including Roundup. A total of 2.055 USD billion is the sum the jury decided to award the couple as the verdict of their lawsuit against Monsanto.

A debate regarding the scientific accuracy was also part of the lawsuit that went into the research behind glyphosate and its carcinogenic risk. Another allegation raised against Monsanto is their lack of accountability in informing their consumers of the potential health risks in using their products. The Millions Against Monsanto Campaign, which was started by the Organic Consumers Association (OCA) in the mid-1990s to protest against the hazard induced by their products, gained prominence during the trial.⁵

Similar lawsuits were filed against the company in the past as well. One such case led to a verdict pronounced by a 6-member jury in the Alameda County, requiring Roundup to pay the plaintiff, diagnosed with non-Hodgkin lymphoma, to the tune of 80 million USD. Another case was when a groundskeeper of a school diagnosed with cancer, found to be due to the use of Roundup and a state court in San Francisco awarded

a figure of 289 million USD, to be paid by Monsanto to the groundskeeper.³

Now the question that arises is, why isn't Bayer disowning their purchase of Monsanto in 2016 for a whopping 66 billion USD? Glyphosate is the answer to all these queries. It is the carcinogenic found in the herbicide, used primarily for killing the weed, and Monsanto holds the patent for the chemical since the 1970s. Although the US Environmental Protection Agency (USEPA) along with the European Food Safety Authority (EFSA) in unison declared glyphosate as non-carcinogenic, the WHO's International Agency for Research on Cancer (IARC) suggested against it, that is, *glyphosate was found to be carcinogenic*.²

It was in the midst of this storm that a jury awarded the Pilliod couple 1 billion USD each in punitive damages and another 55 million USD in collective compensatory damages. Deliberating for four weeks hearing testimonies of doctors, health researchers, and epidemiologist, the jury's verdict came as a reverberating statement for conglomerates to *put the consumers' safety above profits*.⁴ Monsanto is sure to appeal this verdict and may receive a reduced sentence after their appeal. However, this is a significant step in educating the public on the health hazard posed by herbicides and chemicals sold under the guise of scientific breakthrough, against the greed of the corporates.

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Chemical and Biological News

NATIONAL AND INTERNATIONAL DEVELOPMENTS

Intel notes Another front of India-Pakistan Conflict: Poisoning of ration for Indian Army Jawans

3 March 2019

In a recent report, it was noted that Intelligence Bureau has warned the Indian government that Pakistan Military Intelligence and ISI agents operating in Kashmir are planning to “mix poison” in ration stocks of security forces deployed in the Valley. According to oneindia.com, the intelligence report says that they got the information from the chatter that was floated, in which it was suggested that the ration of the Indian Army in Jammu and Kashmir will be poisoned.

Intelligence has claimed to have increased the security of the ration depots situated near LoC and they are also taking some measures to prevent it from happening. The Intelligence also stated that all the already stored ration and the new rations is being checked by a team of specialists.

<https://www.msn.com/en-in/news/newsindia/pakistans-isi-planning-to-poison-ration-stocks-of-indian-army-jawans-intel-note/ar-BBUh01p>

Military Testing at secret UK research base killed almost 50,000 animals

Sean Rayment, 27 April 2019

Sunday Mirror reported that a top secret government research base has killed approximately 50,000 animals in conducting various experiments from blowing up pigs,

infecting monkeys with biological weapons to poisoning guinea pigs with nerve gas. The animals that do not die due to the harsh experiments conducted on them are killed at the end of the test and dissected. The Army has also taken part in “live tissue” experiments in Denmark involving pigs. The beasts were shot in different parts of the body with rifles. Army medics then fought to keep them alive.

The MoD defends the practice, stating that it provides doctors with crucial hands-on experience that aid in saving the lives of British troops injured in battle. A MoD spokesman said “DSTL (Defence Science and Technology Laboratory) is responsible for developing and creating indispensable technology to protect the UK and its armed forces. This could not, currently, be achieved without the use of animals in research. DSTL is committed to reducing the number of animal experiments.”

Animal rights activists have been opposing such inhuman acts quite vocally. A report stated “to deliberately expose live animals to compounds, simulated blasts and biological pathogens which are known, and indeed developed, to cause extreme suffering and death is morally unconscionable. A civilised society, in the 21st century, should not be involved in such macabre and terrible practices.”

<https://www.mirror.co.uk/news/uk-news/almost-50000-animals-killed-during-14792198>

Australia Introduces Digital Bio Security for its Vineyards

April 2019

In a nation-leading program, a Digital Biosecurity platform will be set up to provide

real-time data on South Australian Vineyards to enhance responses to devastating diseases and pests.

Vinehealth Australia Chief Executive Officer Inca Pearce said “the development of the new platform will replace the existing Vineyard Register, providing greater ability to protect South Australia’s vineyards from pests and diseases. Increased global trade and tourism, agricultural expansion and intensification and changing consumer expectations are increasing our biosecurity exposure. By enhancing the Vineyard Register with contemporary technology, we can better support all parts of biosecurity management, including preparedness, prevention, response, surveillance and recovery.”

The new Digital Biosecurity Platform, which will utilise a number of technology platforms including cloud, geospatial data, big data analytics and remote monitoring, is expected to be in operation by 2020. The new platform will establish South Australian grape growers as global leaders in biosecurity and propel the wine and grape industries into next generation technology in this area.

South Australia is in the enviable position of being phylloxera free and this status enables us to maintain some of the oldest vines in the world. To further strengthen South Australia’s phylloxera free status, the State Government has also partnered with Vinehealth Australia to fund nine new biosecurity signs at key border locations highlighting the strict quarantine requirements associated with the entry of phylloxera risk items into the state such as vineyard machinery, equipment, soil and grapes.

Travellers or companies caught breaking the rules when crossing the border or entering the state’s wine regions face fines of up to

100,000 USD. Phylloxera presents a huge risk to our local wine industry and it’s crucial that we remain vigilant in implementing the highest quarantine measures at the border and in our vineyards.

<https://www.barossa Herald.com.au/story/6010186/vineyard-biosecurity-goes-digital/>

Fabric that Protects against Chemical Warfare Agents

D’lyn Ford, 5 April 2019

A new coating for textile fibers has potential for effectively capturing toxic industrial chemicals and chemical warfare agents under real-world conditions, including high humidity. The outcome of the research could be improvised masks and personal protective equipment for soldiers and others at risk of exposure.

Researchers at North Carolina State University and the U.S. Army’s Combat Capabilities Development Command Chemical Biological Center (CCDC CBC) developed functional textiles that neutralized a blistering agent simulant under conditions of 80 percent relative humidity. The new coating also captured ammonia gas, a commonly produced industrial chemical in the U.S.

For more than a century, there had been threats from chemical warfare agents, like chlorine and mustard gas or the recent chemical attacks against civilians in Syria. There was a need to find ways to capture and chemically break down toxic gases for practical, better-performing protective equipment.

Scientists worked with metal-organic frameworks (MOFs) – coatings that are synthesized over microfibers. There are two limitations of this, first, lies in creating MOFs

that can remain stable in the presence of moisture while holding the hazardous compounds in a thin film, a process known as adsorption/absorption. The second is achieving a coating that's effective in degrading toxic chemicals.

The team created a water-stable copper (Cu)-based MOF film. Instead of working with a powder source, researchers used a solid film deposited on the fiber, which captured three times more ammonia gas than the same MOF powder.

Electron microscope images showed MOFs in crystal formations that grew out radially from the fiber – a distinctive shape that hadn't been previously reported. The MOFs bonded strongly with the surface of the polypropylene fibers, resisting flaking when handled in the lab and when swept with a nylon brush. This alignment formed a dense coating on the fibers, with better integration and adhesion to the surface, and improved adsorptive performance for hazardous gases.

The new MOF-coated composites have potential to be used as a base film in protective textiles. The method would also be suitable for use in smart textiles that have multiple functions, such as sensors. Future plans call for testing the new materials with real chemical warfare agents, working with U.S. Army experts at the CDC.

<https://phys.org/news/2019-04-fabrics-chemical-warfare-agents.html>

DISARMAMENT

The Man who Pulled the brakes on America's Biological Weapon Program

Kelsey Piper, April 2019

Matthew Meselson is an American biologist who would be given 50,000 USD Future of

Life Award for spearheading the fight for an international ban on biological warfare. Matthew is currently 88 years and a Thomas Dudley Cabot professor of the natural sciences at Harvard. While working on arms control issues in the 1960s he learned about USA's anthrax development program. The rationale for developing biological weapons at that time was that it was considered a cheap weapon of mass destruction. However, Meselson took proactive steps to deter the American government from undertaking such initiatives and started advocating against stockpiling such weapons. He wrote to every science writer for a newspaper in America, spoke on television and radios against the use of biological weapons. He also got thousands of scientists to sign a petition against biological weapons. By 1969, his initiatives had started yielding results, President Nixon had renounced bioweapons and resubmitted the Geneva protocol to Congress for ratification. However, the Geneva protocol only banned the use of biological weapons and not the stockpiling them or research into developing them, both of which pose significant risks by themselves. Meselson and his peers pushed for a stronger agreement and in 1972 they got the Biological Weapons Convention, which is still in place.

Humanity still faces a significant risk of disaster from pathogens, either deliberately engineered or released by accident. But the Biological Weapons Convention has for the most part been adhered to, and humanity is significantly safer as a result. In granting the award to Meselson, the Future of Life Institute shines a spotlight on an existential risk that can sometimes be ignored in discussions of threats facing humanity.

<https://www.vox.com/future-perfect/2019/4/9/18301321/biological-weapons-xrisks-future-of-life-institute>

Chemical Weapons Decontamination method formulated and patented by the US

Troy Carter, 2 April 2019

US Army patented a ground breaking work on rapid decontamination. The research team at the Army's Chemical Biological Center in Maryland reduced decontamination time down to less than 30 minutes and the amount of water needed to treat large amounts of equipment coated in deadly toxins.

Gregory Peterson, Joseph Myers, George Wagner, Matthew Shue, John Davies, Jr., and Joseph Rossin were listed as the inventors on U.S. Patent 10,245,456, "Process for Decontamination and Detoxification with Zirconium Hydroxide-Based Slurry."

The experiment used sulfolane, a solvent, to divide the chemical weapons from surfaces. Zirconium hydroxide ($Zn(OH)_4$) was also added, which adsorbs the chemical weapons, and dibromo-dimethyl hydantoin (DBDMH), which is used industrially for drinking water purification and paper bleaching. The DBDMH oxidizes and destroys the chemical weapons without corroding equipment.

The sprayable slurry has a paint-like consistency, with thickening agents added to improve its adherence on all kinds of surfaces. Once prepared, it can be stored for a month, which allows chemical or biological incident response teams to prepare.

The decontamination process starts by spraying surfaces within 15 minutes of a contamination incident. Partitioning, adsorption and chemical destruction of the chemical weapons begin immediately. Unlike current decontaminants that can take hours to work, the slurry requires no application brush, scrubbing, agitation, or rinsing, and

does not significantly degrade the object sprayed. Multiple ratios of each component, at the center's Toxic Chamber Facility, was tested which confirmed that the sprayable slurry can reduce the amount of CWAs on military-relevant materials and complex surfaces by up to 1,000-fold. Testing was done on complex surfaces containing grooves, screw threads, and curved surfaces and areas such as a Humvee door. The research team noted an immediate reduction in vapor hazards after spraying, which minimizes operational risk and allows warfighters to quickly continue on their missions.

"As a result of this innovative chemistry, the Army is a big step closer to providing the warfighter the tools for rapidly responding to chemical weapon attacks, but a company to produce it for the marketplace is still needed," Elder said. "It's been prototyped and tested. So, the technology has been substantially de-risked."

Although chemical weapon decontamination is the primary focus of the current testing, future tests at the Naval Surface Warfare Center's Dahlgren Division will establish the slurry's effectiveness against biological agents, such as *Bacillus anthracis* spores.

<https://techlinkcenter.org/us-army-formulates-new-fast-acting-spray-for-chemical-weapons-decontamination/>

INTERNATIONAL COOPERATION

First Responders from Latin American and Caribbean region receive training in Chemical Emergencies Management

6 May 2019

Between 29 April-3 May, 2019, there was an advanced training course conducted for

twenty one first responders from Latin America and Caribbean, in managing chemical emergencies. It was held in Buenos Aires, Argentina. This advanced course was built on the basic course attended by the participants in Panama in March, 2019. It was organized by the National Authority of Argentina to the CWC (Chemical Weapons Convention) based at the Ministry of Foreign Affairs and Worship in cooperation with the Federal Fire-Fighter Superintendence of the Argentine Federal Police and the OPCW (Organization for the Prohibition of Chemical Weapons) Technical Secretariat. All the 16 OPCW countries including Chile, Cuba, Mexico, Argentina participated in this workshop.

Gustavo Zlauvinen, Vice-Chancellor, representative of the Ministry of Foreign Affairs and Worship of Argentina emphasized the strengthening of the partnership between Argentinian institutions and the Technical Secretariat of the OPCW. As this partnership is aimed at developing stronger regional capacities of the Latin American and Caribbean region against chemical incidents, and advancing the implementation of Article X of the CWC.

This is the eight consecutive time, this course has been conducted in the region. And the agenda of this Eight Regional Advanced Assistance and Protection Course and Exercise on Chemical Emergency Response dealt with individual protective equipment, practical exercises in containment, rescue and decontamination procedures.

Background

OPCW sees to the implementation of the Chemical Weapons Convention across its 193 member states, with the global endeavour to permanently eliminate chemical weapons. It was entered into force in 1997, and has been successful in eliminating ninety-seven

percent of all stockpiled chemical weapons. Thus, for its extensive efforts, the OPCW received the 2013 Nobel Peace Prize.

<https://www.opcw.org/media-centre/news/2019/05/latin-american-and-caribbean-first-responders-get-training-chemical>

Australia contributes € 100,000 to OPCW for identification of perpetrators of chemical weapons attacks in Syrian Arab Republic

18 March 2019

The Australian government is providing € 100,000 to the Trust Fund for Syria Missions to form a OPCW team for the purpose of identifying the perpetrators of chemical weapons in the Syrian Arab Republic. This decision is in alignment with the Fourth Special Session of the Conference of the States Parties held in June 2018. The contribution of € 100,000 was formalised on 15 March, with the signing of the arrangement by the OPCW Director-General, H.E. Mr Fernando Arias and the Government of Australia through the Department of Foreign Affairs and Trade represented by Permanent Representative of Australia to OPCW, H.E. Ambassador Matthew Neuhaus. Currently, the Technical Secretariat, OPCW is in the process of assembling a team of experts along with setting up necessary procedures.

Ambassador Neuhaus emphasized the need to strengthen global arrangements for preventing proliferation of weapons of mass destruction, as one of the national priorities of Australia. Hence, the government has welcomed OPCW's decision to boost the ability to investigate and attribute responsibility for any future use of weapons. It is part of their efforts to enhance safety and security in the nation and international community.

Background

The Conference of the States Parties to the Chemical Weapons Convention (CWC) adopted the decision to address the threat from use of chemical weapons, at its Fourth Special Session. Accordingly, the perpetrators of the use of chemical weapons in the Syrian Arab Republic should be identified. And information pertaining to the source of the chemical weapons, in cases where their use has been suspected should be reported by the OPCW Fact-Finding Mission.

<https://www.opcw.org/media-centre/news/2019/03/australia-contributes-eu100000-help-opcw-identify-perpetrators-chemical>

OPCW Issues Fact-Finding Mission Report on Chemical Weapons Use Allegation in Douma, Syria, in 2018

1 March 2018

The OPCW's Fact-Finding Mission (FFM) issued the final report with regard to its investigation of the alleged use of toxic chemicals in Douma region of Syrian Arab Republic. The FFM was engaged in on-site visits to collect environmental samples, conduct witness interviews as well as gather data. Other inputs like toxicological and ballistic analysis, environmental and biomedical samples analysis results were also examined. The evaluation of the above mentioned information has provided FFM reasonable grounds to prove the usage of chemical weapons in the region, on 7th April, 2018. This chemical weapon was composed of molecular chlorine.

The report has been shared with the States Parties to the Chemical Weapons Convention, a briefing for the same shall be conducted at OPCW headquarters in the

Hague. Simultaneously, the report has been sent to the UN Security Council.

Background

The persistent allegations of chemical weapon attacks in Syria led to the formation of OPCW Fact-Finding Mission (FFM) in 2014. It is responsible for determining the use of toxic chemicals or chemical weapons in Syria, with the information provided by Syrian Arab Republic and others. Previously, FFM was able to determine the use of chlorine, sulphur mustard as well as sarin as chemical weapons in the Syrian Arab Republic. It issued an interim report on 6 July, 2018 regarding its investigation into the allegations of chemical weapons use in Douma in April 2018.

<https://www.opcw.org/media-centre/news/2019/03/opcw-issues-fact-finding-mission-report-chemical-weapons-use-allegation>

Marshall Islands and Maldives draft legislation implementing the Chemical Weapons Convention

12 March 2019

Between 4 – 8 March, 2019, the 21st session of the Internship Programme for Legal Drafters and National Authority Representatives was conducted. During the programme, representatives of Marshall Islands and Maldives devised plans for the implementation of the Chemical Weapons Convention in their respective countries. The internship programme was conducted by OPCW for a week to extend help to both the countries with the implementation of provisions of the Chemical Weapons Convention (CWC) in their national legislations.

The programme not only helped the participants learn about the obligations

under the CWC, but also improved their legal drafting skills through various practical exercises. The two delegations formed during the workshop, prepared drafts, implemented bills as well as national action plans, through activities and indicative timelines. And these are to be employed as a reference for the Technical Secretariat to further the adoption process.

Background

The Internship Programme for Legal Drafters and National Authority Representatives was formed in 2012. Till now 45 countries have been a part of this legal workshop. Among them, Panama, Grenada, Paraguay, Uganda and others have successfully enacted national legislation, while others are at different stages of the adoption process.

<https://www.opcw.org/media-centre/news/2019/03/opcw-supports-marshall-islands-and-maldives-draft-legislation>

Japan Contributes €2.4M for developing OPCW Centre for Chemistry and Technology

27 February 2019

Japan has contributed € 2.4 million to OPCW Trust for the purpose of upgrading the current OPCW Laboratory and Equipment Store. It will result in the construction of a new facility, the OPCW Centre for Chemistry and Technology ("ChemTech Centre"). The donation was formalised today in a ceremony involving the OPCW Director-General, H.E. Mr Fernando Arias, and Japan's Permanent Representative to the OPCW, H.E. Ambassador Hiroshi Inomata, at OPCW Headquarters in The Hague.

Ambassador Inomata remarked that the OPCW Laboratory is essential in light of preventing the use and recurrence of

chemical weapons, as it ensures a fair and impartial international mechanism. A worldwide core facility for improving expertise on the analysis and verification methods with regard to cases wherein use of chemical weapons is suspected is needed. Along with Japan, more 13 states have contributed or pledged to make financial contribution to this project.

Background

ChemTech Centre, is part of the on-going project and seeks to strengthen OPCW's capabilities for addressing emerging threats of chemical weapons, at the same time, support capacity building in OPCW member states. There is a need for a new facility to meet the demands of OPCW States Parties for enhanced verification tools, improved detection capabilities and response measures, as well as increased capacity-building activities. It shall help OPCW in keeping track with the developments in science and technology as well as chemical weapons threats. Many states like Algeria, Belgium, France, UK, and others, have contributed or pledged to contribute to the project.

<https://www.opcw.org/media-centre/news/2019/02/japan-contributes-eu24m-future-opcw-centre-chemistry-and-technology>

Book Review

Toxic Warfare

Author: Theodore Karasik

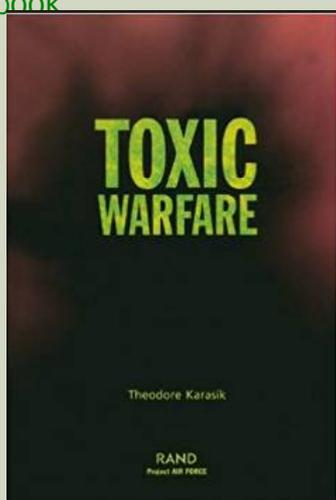
ISBN: 978-0833032072

Divya Razdan

Divya Razdan has worked as an investigative journalist with experience in both electronic and print media. She is currently associated with IDSA's Centre for Strategic Technologies.

Summary

The book has been instrumental in building a positive momentum in favour of crisis response planning in case of any toxic warfare affecting military and civilian lives. The book explores the possible threats and attacks in the past which indicates that toxic warfare is no fiction but reality. The specific dwellings on the subject, keeping the focal point the U.S military forces and civilians in the country, has been majorly discussed in the book



Theodore Karasik's book on "Toxic Warfare" has been published more than one and half decades back, still it remains relevant today as the Syrian theatre continues to face the threat of Chemical Weapons. Indeed, a positive momentum has been built in favour of crisis response planning in case of any toxic warfare affecting military and civilian lives. Nowadays' non-conventional war tactics are regarded as highly efficient and convincing. There has been an increasing interest in weapons which include chemicals and industrial waste as these resources are neither very expensive nor difficult to access. Toxic warfare is actually the use of chemicals, industrial waste which are powerful enough to harm or alter the behaviour of an adversary in any crisis. Therefore, toxic warfare does not need the use of conventional weapons rather it can be easily be used through the release of such substances into the environment leading to the possibility of huge mass outcry.

The author indicates clearly the toxic weapons and their usage on various occasions. In comparison to chemical weapons that involve the use of substances that are banned like nerve agent sarin and others, toxic weapons are not required to be made out of high-end technology. For toxic warfare, one needs not to be highly technical and can avail the resources easily. There are many types of hazardous materials that can function as toxic warfare such as irritants, choking agents, flammable industrial gases, water supply contaminants, and organophosphate pesticides, etc. In chapter 1, the author introduces some examples of toxic warfare which are commonly accessible around the world. It would not be incorrect to say that any usage of toxic substances for attaining political and military goals, the consequences will be high. In some cases,

toxic warfare has been ineffective but that does not mean the threat does not exist, even if it is low. Since it is easily accessible, it can be seen as a “weapons of opportunity” by many state and non-state actors as indicated by the author. There remain enough possibilities within the U.S (United States of America) where such kind of weapons can be used by some rouge or radicalized groups working on domestic or international agendas.

The author takes these arguments one by one and seeks to understand the composition of the toxic weapons in detail. Toxic warfare requires the use of inert chemicals which in some cases can produce immediate or mild health effects. Even the dust agents can be considered as a part of toxic warfare. There are various forms of toxic waste which includes petroleum spills, smoke refuse, sewage, and medical waste, etc. These substances have a different degree of effects on the environment and people. Nevertheless, chemical weapons convention (CWC) regulates the use of chemical substances and also to some degree the toxic weapons in the warfare. Numerous substances used in toxic weapons are found in CWC list which aims at super-lethal weapons that involve nerve agents and dual use of chemicals. The sources of chemical toxins for the state and non-state actors can be in the formulation of paint, organic-chemical producers, pesticides, pharmaceutical wastes, lead, mercury and cadmium-nickel battery manufacture, textile mills, cosmetics manufacturing, etc.

The author bifurcates toxic warfare into three categories that are: Health hazards, damage to or contaminate of military or civilian infrastructure and psychological effects. The book reveals some real incidents like in 1970, the exposure of gases which was liable for a big, potentially dangerous vapor

release in a metropolitan area where the explosion involved a 30,000-gallon capacity tank. Another incident that took place in Bhopal, India, where an employee of the company had mixed water into Methyl Isocyanate (MIC) in 1984. The deadly gases released from the mixture of water and MIC affected people with horrendous impacts which resulted in more than 3800 fatalities. Consequences like these are indeed the main trademark of toxic warfare.

In chapter 3, the book reveals about the brainstorming done from time to time about the toxic weapons and its probable usage. There is no doubt that toxic weapons benefit the cause of state and non-state actors who seek to recondition there various military and political agendas. There is enough availability of industrial and chemical waste at a low cost that can be deployed through air delivery like missiles and rockets, land delivery like cars and trucks, etc. However, there is uncertainty in getting desired success by using toxic weapons as there is huge ambiguity in their effects on the surrounding and target points, and also because the weapons are often difficult to target and there physical impacts may be inconsistent. Nevertheless, such kind of weapons where much of it is easily available in the world with ease makes it the next preferred option for terrorists, insurgents and rogue nations. These weapons are perceived to have better tactical and psychological advantages in the situation of non-conventional war. The author clearly depicts how significant interest has been developed in such weapons by more sophisticated terrorist networks across the world. The book also indicates how raids on Al-Qaeda cells both in Europe and Afghanistan have revealed that the Al-Qaeda terrorists were planning about the deployment of toxic weapons. Toxic warfare by design is a weapon for non-conventional war and terrorists are planning more

complex compositions and strategies to incorporate these toxic weapons in their execution.

U.S has been known to face threats of toxic warfare and often seems prudent to acknowledge it as the only threat to its forces in military operations but also civilian within the country. This increases the risk of toxic warfare and its easy availability of resources increases the probability of attacks. This is a grave problem that is correlated to the massive number of sites in the country where chemicals are stored which can lead to mass destruction. Therefore, the first responders of the United States in case of the toxic warfare are those individuals who are part of an organization responsible for responding to an incident involving a weapon of mass destruction. The author reveals that first responders are personnel from the medical, law enforcement, fire or rescue, and Explosive Ordnance Disposal (EOD) organizations. Also, civilian preparedness efforts must be well synchronized and information sharing can play a vital role in dismantling the huge psychological impact of the toxic warfare in the country.

Toxic warfare is a reality and should be taken seriously with pro-active measures. Unfortunately, the increase in the interest of toxic weapons by the non-state actors have raised alarming concerns for global prosperity and peace. The persistent use of small scale toxic weapons there of signals that state and non-state actors alike recognize that they are in possession of a potent weapon. However, it seems U.S understanding of this threat has improved, particularly for current counterterrorism operations. The book provides useful detailed documentation on toxic warfare but falls short of making recommendations or guidelines on proactive measures regarding the issue. The only shorting coming from the book is that it doesn't formulate any

narrative and direction for the general public so as to counter the toxic warfare. Therefore, a carefully calculated risk assessment should reflect upon as a medium for better planning and strategic thinking to carry out proactive measures to counter the threats of toxic warfare.

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