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Editorial

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In the last decade, no country in the world has suffered from the use of chemical weapons as much as Syria. Approximately 1,472 victims were killed and 9,989 injured in 222 chemical attacks, 217 of which were alleged to have been carried out by the Syrian Regime. In this backdrop, 30 November marked the "International Day of Remembrance for All Victims of Chemical Warfare," adopted by the Conference of the States Parties (CSP) to the Chemical Weapons Convention (CWC) at its 20th session in 2015.

Even in the 21st Century, Chemical and Biological Weapons remain a potent threat to the national security matrix. The winter publication of Chemical and Biological Weapons (CBW) Magazine brings forth cases of non-compliance with the CWC and policy breaches. In this context, Animesh Roul reports a recent event, where the US has alleged that Myanmar is non-compliant with the CWC, due to its failure to declare past chemical weapons programme and by virtue of destroying its chemical weapons facility. In another case, in July 2019, Dr. Xiangguo Qiu, an outstanding Chinese scientist, her colleague and husband Keding Cheng, and an unknown number of her students from China were asked to leave Canada's National Microbiology Laboratory in Winnipeg, reports Dany Shoham. Ms Kanchana Ramanujam writes on the advances in Biotechnology and the dual use nature of the technology also makes it a potent tool for the military. The edition also carries an article by Dr Monis Raza that reflects on the preparedness in case of Bio-disasters and the role of dentists.

This issue also comprises other features like Opinion, Book Review 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:
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China's Biological Warfare Programme and the Curious Case of Dr. Xiangguo Qiu

Dr. Dany Shoham

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Summary

In July 2019 Dr. Xiangguo Qiu, an outstanding Chinese scientist, her colleague and husband Keding Cheng, and an unknown number of her students from China were removed from Canada's National Microbiology Laboratory in Winnipeg. The Public Health Agency of Canada (PHAC) said that it advised the Royal Canadian Mounted Police (RCMP) about "possible policy breaches." Qiu was also a part of the team that developed ZMapp, an experimental treatment for Ebola used during the 2014 outbreak in West Africa.

In July 2019, a rare event occurred in Canada, whereby a group of Chinese virologists were forcibly dispatched from the Canadian National Microbiology Laboratory (NML) in Winnipeg, a facility they worked in, running parts of the Special Pathogen Programme of Canada's Public Health Agency.[1] Experimental infections - including aerogenic ones - of monkeys with the most lethal viruses found on Planet Earth comprise nearly a routine therein. Four months earlier, a shipment of two exceptionally virulent viruses dealt with in the NML - Ebola and Nipah viruses - was on its way from NML, ended in China, and has thereafter been traced and regarded to be improper, specifically put as "possible policy breaches", or rather but an "administrative issue", ostensibly.[2]

Yet the scope of this incident is much wider, in actuality. The main culprit seems to be Dr. Xiangguo Qiu, an outstanding Chinese scientist, born in Tianjin. Heading until recently the Vaccine Development and Antiviral Therapies section of the Special Pathogens Programme, she primarily received her medical doctor degree from Hebei Medical University in China in 1985 and came to Canada for graduate studies in 1996.[3] Later on, she was affiliated with the Institute of Cell Biology and the Department of Pediatrics and Child Health of the University of Manitoba, Winnipeg, not engaged with studying pathogens.[4] But a shift took place, somehow. Since 2006,[5] she has been studying powerful viruses, Ebola virus foremost, in the NML. The two viruses shipped from the NML to China - Ebola and Nipah - were studied by her in 2014, for instance (together with the viruses Machupo, Junin, Rift Valley Fever, Crimean-Congo Hemorrhagic Fever and Hendra).[6] Yet utmost attention has been paid to Ebola, with

the highly legitimate aim of developing effective prophylaxis and treatment for infected people. Inevitably, her works included a variety of Ebola wild strains - among them the most virulent one, with 80% lethality rate - and much relied on experimental infections of monkeys, including via the airways.[7] Remarkable achievements were attained, indeed, and Dr. Qiu accepted the Governor General's Innovation Award in 2018.

So far so good, seemingly. But the collateral Chinese plexus cannot be ignored. Married to a Chinese scientist - Dr. Keding Cheng, also affiliated with the NML (specifically the "Science and Technology Core"), and primarily a bacteriologist who shifted to virology - Dr. Qiu frequently visited and maintained tight bonds with China, generally speaking, and many Chinese students joined her works in the NML during the recent decade, coming from a notable range of Chinese scientific facilities. Nonetheless, among the latter there are four facilities that have been regarded to possess parts of the Chinese biological weapons alignment,[8] namely:

- Institute of Military Veterinary, Academy of Military Medical Sciences, Changchun[9].
- Center for Disease Control and Prevention, Chengdu Military Region[10].
- Wuhan Institute of Virology, Chinese Academy of Sciences, Hubei [11].
- Institute of Microbiology, Chinese Academy of Sciences, Beijing[12].

All of the four mentioned facilities collaborated with Dr. Qiu within the context of Ebola virus, yet the Institute of Military Veterinary joined a study on the Rift Valley fever virus too,[13] while the Institute of Microbiology joined a study on Marburg virus too.[14] Noticeably, the drug used in the latter study - Favipiravir - has been earlier tested successfully by the Chinese Academy of Military Medical Sciences, with the designation JK-05 (originally a Japanese patent registered in China already in 2006), against Ebola and additional viruses.[15]

However, the studies by Dr. Qiu are considerably more advanced and fruitful, in certain aspects. They are apparently vital for the Chinese biological weapons developing, in case Ebola, Nipah, Marburg or Rift Valley fever viruses are included therein, which is a plausible postulation; let alone the wild type viruses in themselves. And it is of note that only Nipah virus is naturally found in China or neighboring countries. Collectively, then, the interface between Dr. Qiu and China has a priori been highly suspicious. On top of it, the shipment of the two viruses from NML to China apparently generated an alarm, beyond its seeming inappropriateness. And an unavoidable question is whether previous shipments to China of other viruses or other essential preparations, took place from 2006 to 2018, one way or another.

At any rate, the controversial shipment brought about the entering of information technology specialists into Qiu's office after hours, for her computer. Consequent to the incident, security access for Dr. Qiu, her husband and the Chinese students was revoked. Her regular trips to China also started being denied.[16] Notably, Dr. Qiu made at least five trips over the school year 2017-18 to the above mentioned Wuhan National Biosafety Laboratory of the Chinese Academy of Sciences,[17] which was certified for BSL4 in January 2017. Moreover, in August 2017, the National Health Commission of China approved research activities involving Ebola, Nipah, and Crimean-Congo hemorrhagic fever viruses at the Wuhan facility, and in March 2019, the Chinese published their tour de force.[18]

Jens Stoltenberg, the secretary-general of NATO, said at a news conference he couldn't comment on this specific case but appeared to suggest the possibility of espionage. "What I can say in general is that we have seen increased efforts by the nations to spy on NATO allies in different ways," he noted.[19] Connectedly or not, Dr. Qiu collaborated in 2018 with three scientists from the US Army Medical Research Institute of Infectious Diseases, Maryland, studying post-exposure immunotherapy for two Ebola viruses and Marburg virus in monkeys; a study supported by the US Defense Threat Reduction Agency.[20]

Finally, the multiplicity of the Chinese grants - all of on a national level - supporting the works done under the leading of Dr. Qiu in the NML is rather intriguing; included are:

- National Key Program for Infectious Disease of China
- National Key Research and Development Program of China
- National Natural Science Foundation of China International Cooperation and Exchange Program
- Special Foundation of President for Ebola virus research from the Chinese Academy of Sciences.
- President's International Fellowship Initiative from the Chinese Academy of Sciences
- China National Key Subject of Drug Innovation
- Youth Innovation Promotion Association of the Chinese Academy of Sciences
- National Natural Science Foundation Award, Ministry of Science and Technology
- National Science and Technology Major Projects
- Beijing Advanced Innovation Center for Structure Biology
- Major Program of the National Natural Science Foundation of China.

Certainly an impressive list.

In sum, there is still a possibility that Dr. Qiu and her husband will return to work in the NML. Yet beyond the administrative dimension of this complicated affair, it is largely also a matter of intelligence analysis and assessment, which might constitute a 'gray area'. A challenge for the Canadian Security Intelligence Service. Time will tell, sooner or later.

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Impact of Plant Extracts in Neutralizing Threats from Bio-Organisms: Opening New Vistas in Bio Terror and Healthcare

Mr. Amul S Bahl

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Summary

Bio-organisms are a serious threat to mankind today. With the increasing resistance to antibiotics and few discoveries in new antibiotics, the healthcare risks of individuals and societies have increased manifold. Coupled to this, constant mutations in microbes need a different dimension to counter such bio-organisms. Alongside healthcare problems, deliberate use of bio-organisms as agents of terror is a threat that has no counter today. This paper presents 'Whiff Bio-Spray,' a breakthrough solution to neutralize these bio-organisms through the use of active plant extracts.

Introduction

A bio-organism, in Collins dictionary, is defined as "a dangerous fast-proliferating organism that could be used as the basis of a biological weapon"[1]. These bio-organisms can be in the form of bacteria, viruses, spores and other germs. These are also referred to as microbes and may cause serious health concerns. These bio-organisms/microbes are found in nature. But these bio-organisms can be made more lethal and harmful by increasing their ability to cause disease, spread, and/or to resist medical treatment on a large uncontrollable scale.[2]

Medical science has solutions to various diseases caused by these microbes. Antibiotics are one of the important treatment lines in modern medicine towards combating infections and providing a cure.[3] However, antibiotic resistance among microbes is a serious global concern.[4] There is also a simultaneous concern of microbe mutations which result in antibiotic resistance.[5] Antibiotic resistant bacteria resulted in at least 2 million infections and 23,000 deaths a year resulting in a 55-70 USD billion per year economic impact in the United States alone.[6] Under the recommendations of the US President's Council of Advisors on Science and Technology, President Barack Obama asked the National Security Council to prepare a draft for a comprehensive national action plan towards managing antibiotic resistance.[7] It is considered to be a challenging task to find new antibiotics due to the cost factor as well as the difficulty of finding new drugs by itself. It is suggested to have alternative solutions for the treatment and control of infections, like, non-antibiotic drugs, and non-bio-molecule

approaches.[8] Alternative therapies and herbal medicines are recommended as a credible solution.[9]

On the one hand, these bio-organisms can cause various diseases in a natural way but on the other hand, can be a cause of bioterrorism. The spectre of bio-terror may become larger than life due to subversive activities in backyard, rogue nations and disgruntled scientists in possession of these bio-organisms. Bioterrorism is a term referred to the intentional use of pathogenic strains of microbes to cause disease or death in living entities and/or to give harm to the environment.[10] There are always threats of bioterrorism, for example, the outbreak of pneumonic plague (well-known spread in biological warfare) in Surat and bubonic plague in Beed in 1994 put India's defence and intelligence units on alert.[11] Bioterrorism is a world-wide concern. In current times example, powdered anthrax spores were placed in letters mailed through the U.S. postal system in 2001 where 12 mail handlers got anthrax and five people died.[12] Since 2001, the United States Government has made significant efforts towards responding to acts of bio-terror. The 'National Strategy of Countering Biological Threats' by the United States shares to work nationally and internationally with possible partners for the health security of all people due to any kind of bio-threat. This strategy of countering biological threats includes all citizens, societies, communities and international partners to be aware and to have protection from bio-threats.[13] The bipartisan Blue-Ribbon Study Panel on Biodefence strongly indicates to have National Biodefence Strategy to protect the United States from bio-attacks. The Panel indicates that there is a need to assess how much has been done and what needs to be done more to protect The United States from bio-attack.[14] The US Senate passed the "Bioterrorism Act of 2002" to strengthen the area of biodefence.[15] It is many-a-times not known immediately whether the spread of bio-organisms is natural or accidental or deliberate. Therefore, bio-attack is a global threat rather than an isolated threat for a specific geographic area.

There are a number of agents which can be used for bioterrorism and are categorized into three categories (Figure 1); viz. Category A, B and C.[16] Figure 2 presents the risk attributes for these three categories of bioterrorism agents.

Figure 1: Categories of agents used in bioterrorism

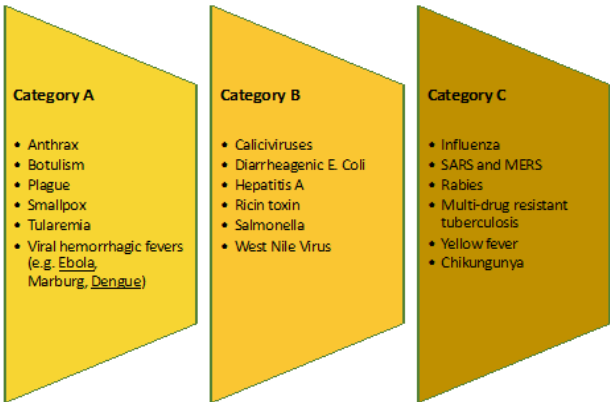
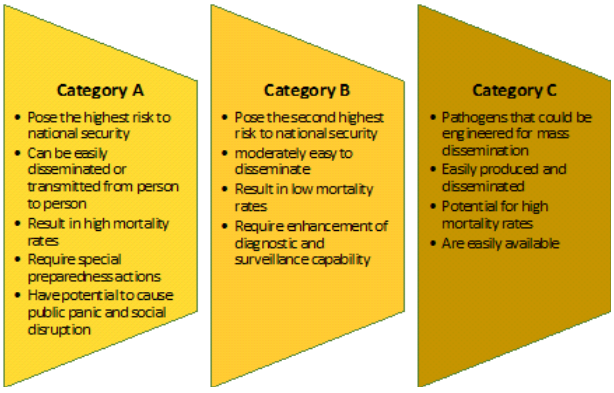


Figure 2: Understanding of risks with Category A, B and C bioterrorism causing agents



Thus, in sum, there are a number of risks (Figure 3) from bio-organisms causing the spread of diseases or the possibility of using them in bioterrorism. This is likely to result in a number of infections which become

difficult to cure due to bacteria or microbe's resistance to treatment (medicines) and adverse drug reactions. These are likely to lead toward treatment failures and economic losses.

Figure 3: Possible risks to living beings due to bio-organisms

These bio-organisms can spread via a number of mediums including air, water, in food or even from person to person.[17] There is a most likely disposition of these bio-organisms through the air either as an aerosolized or powered preparation.[18] The spread of bio-organisms needs protection of living entities across the globe like the spread of swine flu[19] took place beyond its place of origin. A high possibility of cocktail spread of bio-organisms especially in case of bioterrorism, it is difficult to ascertain a treatment of bio-attack because one may not identify a set of possible diseases due to a combination of unknown bio-organisms and their interactions. Such a scenario goes way beyond an epidemic like medical emergency and requires measures more urgent, emergent and drastic akin to disaster relief. In other words, multiple vectors need to be addressed concurrently.

Keeping in consideration the fatal effects of bio-organisms as a national as well as a global threat, the objective of this paper is to present a solution called Whiff bio-spray as a bio-defence in neutralizing the effects of bio-organisms for health care as well as to counter bioterrorism anywhere in the world.

Whiff Bio-Spray has been designed on the QLEN Model of disaster relief (developed by the author). The QLEN Model, when applied to Whiff Bio-Spray (Figure 5) is as follows:

Quick- mobile solutions hence quick response; also quick acting once sprayed

Localization- localize/confine infection to an area; avoid spread: Whiff bio-spray acts quickly to confine to a localized area thereby blunting the lethality of the spread of bio-organisms

Elimination- of bio-organisms

Neutralization- of the bio-organism/terror threat

This QLEN approach helps in achieving the key objectives as mentioned in a key US Government report- A National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts.[20] It helps towards the mission of the Federal Government during a biological incident which is to:

- save lives
- reduce human suffering
- protect property and the environment
- control the spread of disease
- support community efforts to overcome the physical, emotional, environmental, and economic impacts

A solution to bio-organisms: Whiff Bio-Spray

(a) Whiff bio-spray and it functioning

In Ayurveda literature, it is indicated that active phytochemical constituents of

individual plants can be used to form a polyherbal formulation for therapeutic effects.[21] Plant-extract oils have antibacterial and antifungal activities, and can also overcome problems of antibiotic resistance.[22]

Within the realm of Ayurvedic medicinal benefits, the author has developed a technological breakthrough (Figure 4) using plant-based extracts which is a simple, safe and effective herbal solution (referred as 'Whiff bio-spray' in this paper) to counter bio-organisms. It is a 100% natural spray of herbal extracts with no side effects and after-use did not leave any. In other words, there is no ecological fallout and get completely bio-assimilated without leaving behind any biological residue. The herbal contents of the bio-spray act as neutralizing agents which float in the air to neutralize bio-organisms in the air. The bio-spray was done with the help of micro-fog atomizer.[23] The micro-fog system enables the slow release of neutralizing agents in the bio-spray to float in the air to neutralize the air bio-organisms (Figure 5).

Figure 4: Whiff bio-spray features and benefits

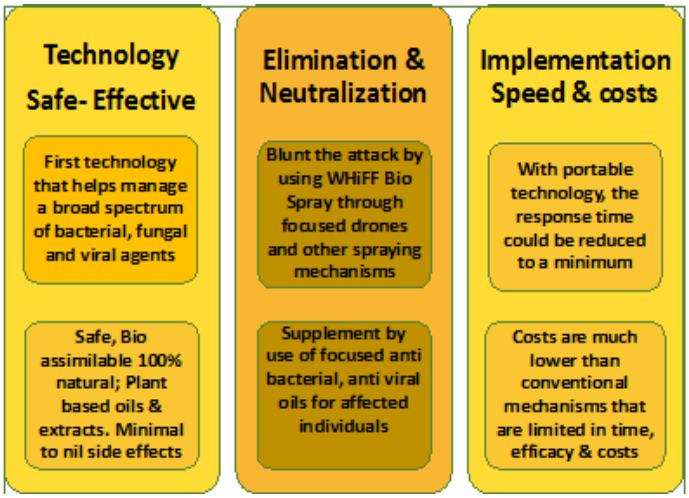
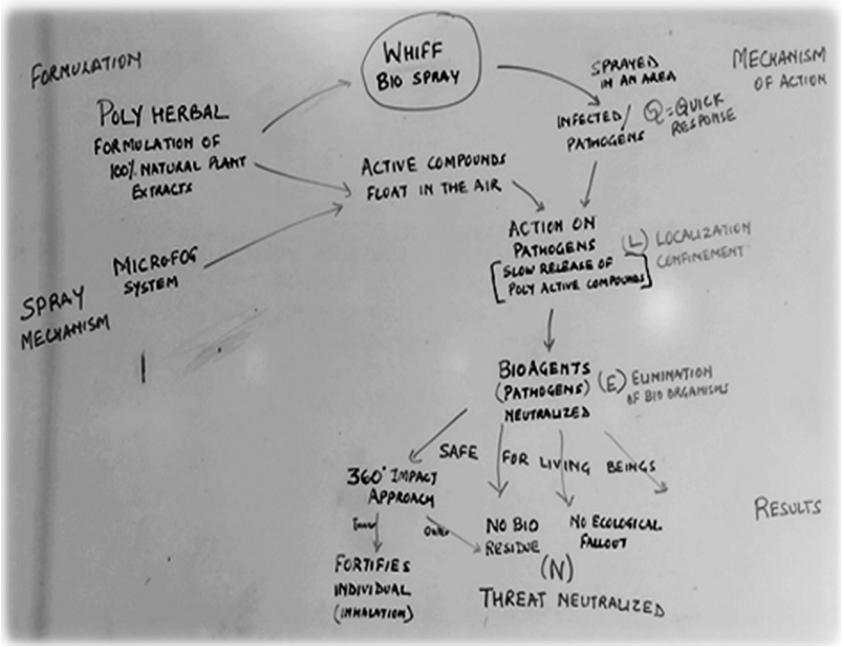


Figure 5: Functioning of Whiff bio-spray and QLEN Approach



Apart from the QLEN benefits, the Whiff bio-spray gives key strategic advantages through its deployment.

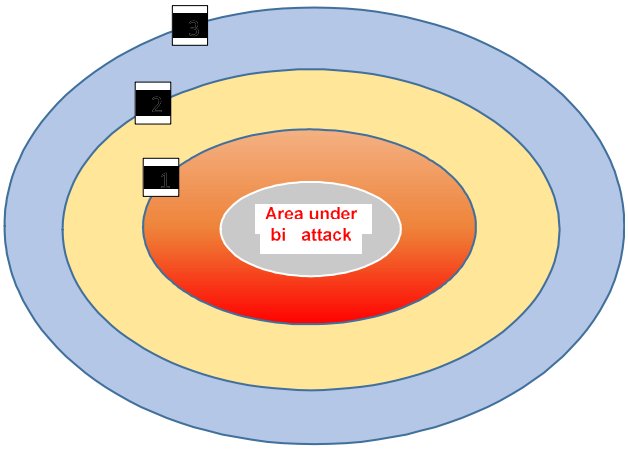
1. Quick acting and quick response: It acts in minutes to neutralize bio-organisms and thus can save precious human lives from being infected or death. It also arrests the spread of the bio-organisms at a fast pace.

2. Mobility: There is no requirement of huge capital expenditure or fixed equipment to spread Whiff bio-spray in the area under bio-attack. It can be deployed quickly and effectively at any place. In large open areas, low flying drones can be effectively used to spread Whiff bio-spray.

3. Comprehensive elimination of a broad spectrum of pathogenic payload: Whiff bio-spray is effective to eliminate a broad spectrum of pathogens and viruses and thus can effectively counter and neutralize a cocktail kind of bio-attack.

As a strategy to counter a bio-attack efficiently and effectively, Figure 6 illustrates a way of using Whiff bio-spray. Whiff bio-spray can be sprayed at three concentration levels (Figure 6) not only to counter bio-organisms effect in the affected area but also to manage the spread of bio-organisms in adjacent areas to neutralize the bio-terror threat and action. In other words, it will prevent the proliferation of bio-organisms from the area under bio-attack to surrounding areas. Further to use bio-spray at three concentration levels, there is a need to look at the wind direction and wind speed to let float bio-spray with air along bio-organisms.

Figure 6: Whiff Bio-Spray at three concentration levels of pathogenic bio-agents to counter and neutralize a bio-attack



Note: Concentration leaves of bio-agent where level 1, 2 and 3 means

Level 1 = Maximum concentration, Level 2 = Medium concentration, Level 3 = Low concentration

(b) Effectiveness of Whiff bio-spray

The bio-spray effectiveness was tested both in a laboratory environment and in a real-life situation. First, a test was conducted in a controlled laboratory set-up to study the impact of the bio-spray on drug resistant bio-organisms. This test was conducted at one of the laboratories certified by the National Accreditation Board of Testing and Calibration of Laboratories. The test on bio-organisms was done through the Four Plate test to map efficacy and anti-microbial action of the bio-spray on the air microbes. The bio-spray was further tested on total bacterial, yeast and mould count, E. Coli, Salmonella, Pseudomonas aeruginosa and Staphylococcus aureus. Viable bio-organisms were reported before bio-spray and 4 hours after bio-spray in 12x8 ft room. A notable reduction was measured in bio-organisms by 68-93% after bio-spray in the controlled laboratory room (Table 1). A higher concentrate Whiff bio-spray counters the pathogen count to completely eliminate them, as was seen in the pilot study conducted at AIIMS Delhi. The microbial count was also significantly countered by the Whiff bio-spray (Table 2).

Table 1: Bacteria Pathogen Plate test in laboratory (Report No. DTRLF-100118080)

Table 2: Microbial contamination test in the laboratory (Report No. DTRLF-100118076)

Microbial Test for	Result
Total bacterial count	Less than 10 cfu/ml
Total yeast and mould count	Less than 10 cfu/ml
E. Coli	Absent in 1 ml
Salmonella	Absent in 10 ml
Pseudomonas aeruginosa	Absent in 1ml
Staphylococcus aureus	Absent in 1ml

After the laboratory test, a bio-spray effectiveness pilot study was conducted in real-life set up in a controlled hospital environment in accordance to the protocol of the hospital at the Department of Microbiology of the All India Institute of Medical Sciences (AIIMS), Delhi. The results have shown a significant reduction in air-pathogens. This indicates that the bio-spray is effective to counter bio-agents/ bio-organisms in the air and in turn, will protect from the ill effects of it.

Discussion

Barton Gellman, an American journalist, has indicated that "in biological weapons, there is almost no prospect of detecting a pathogen until it has been used in an attack". Considering the same, Whiff bio-spray is an effective tool to counter a fatal attack due to unknown bio-organisms. Whiff bio-spray will be able to counter the air-borne spread of bio-organisms quickly irrespective of the geographical area, wherever required. It is efficient to protect the fatal effects of bio-attack on humans and animals by quick and comprehensive elimination and neutralization the bio-organisms. Thus, Whiff bio-spray is an effective decontamination measure. Decontamination means to remove or neutralize chemical and biological weapons (CBW) to limit their exposure to humans[24] and at present, there is no direct solution to neutralize and eliminate these bio-organisms (bio-weapons). Under biodefense against bio-attack, medical measures are suggested to protect people, viz. medicines and vaccinations; and other protective/preventive measures like non-exposure to air.[25] These measures work on the after-effects of bio-attack rather than on the exact payload of bio-attack (that is bio-organisms) where Whiff bio-spray is the effective bio-assimilable natural herbal solution.

Whiff bio-spray also helps reduce air pollutants; viz. PM2.5, PM10, formaldehyde (HCHO) and total volatile organic compound (TVOC)[26], and also improves air quality by reducing CO2 (Carbon-di-oxide) and reducing the impact of toxins in the air (Figure 7). This will result in curbing many respiratory diseases and in turn will lead to better health. A study identifies that in PM2.5 and PM10 samples of polluted air, the relative number of pathogenic bacteria was highest in the heavy and moderate polluted air.[27] Thus, it can be safely analysed that if a bio-attack happens in highly polluted air, even then Whiff bio-spray will be able to counter and neutralize bio-organisms as well as pollutant carriers. Further, a study indicates that plant-based essential oils are effective to deal with the problem of antibiotic resistance.[28] Again, Whiff bio-spray will be able to counter the antibiotic resistant bio-organisms. In reference to Figure 8, it will not be an exaggeration to indicate Whiff bio-spray as Vishwa Guru as an answer not only to counter pollution, counter negative effects of bio-organisms on health of living entities, counter antibiotic resistant microbes but also a solution for bioterrorism with no side-effects and resulting in organic elimination and neutralization of fatal organisms.

Figure 7: Role of Whiff bio-spray in improving air quality

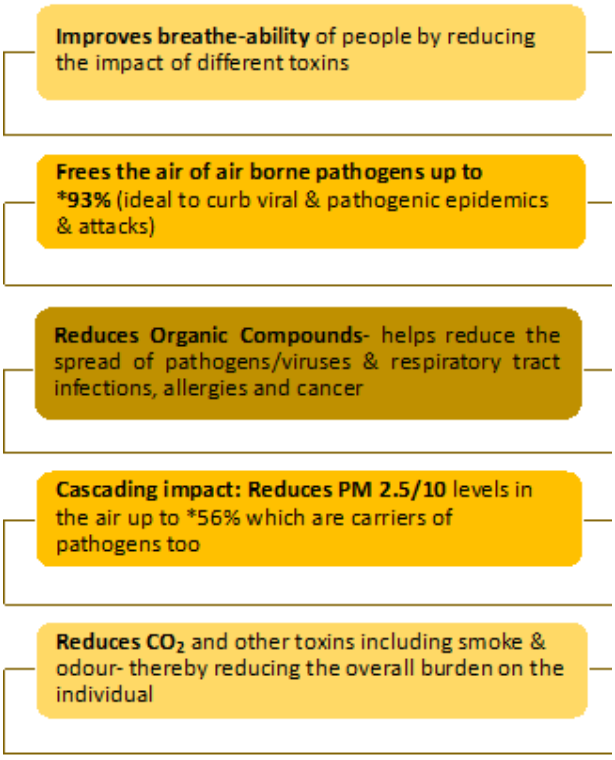
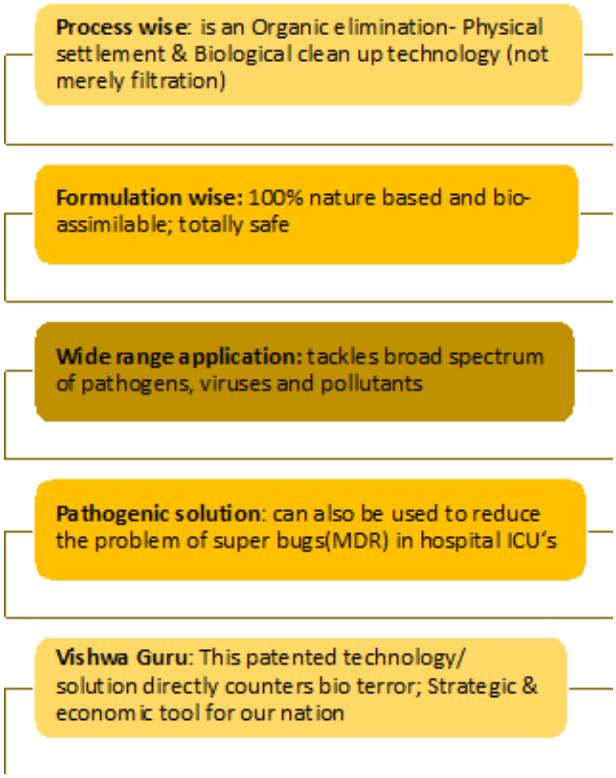


Figure 8: Whiff bio-spray in nutshell



Conclusion

Bio-organisms are a cause of fatal health conditions and global threat of bioterrorism. The countries across the globe are concerned and formulating measures to address the lethal effects of bio-organisms on mankind and all living beings in general. The present measures to protect health and environment are primarily addressing the after effects of bio-organisms rather than the cause (bio-organisms) itself. Whiff bio-spray is a primary measure to counter and neutralize pathogenic bio-agents directly by eliminating them from the area of attack whether towards naturally occurring diseases or towards accidental spread / deliberate bio-attack. Whiff bio-spray is 100% plant extract-based solution and bio-assimilable with no side-effects. Knowledge, access and usage of Whiff bio-spray can help individuals, communities and nations to fight bio-threats both safely and economically.

Endnotes:

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Managing Bio-disaster: Role of Dentist

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Summary

Over the past few decades, global events indicate that the threat of biological attack is not a myth, but a harsh reality. The medical community needs to educate both the public and policy-makers on bioterrorism and create a global consensus to reject its use for longer-term solutions. Dentists can provide their patients and communities with a valuable service by providing quality information on the potential for attacks, what to watch for, and how to respond appropriately if an attack occurs. This review provides a brief summary of biological terrorism with the role of medical fraternity in counteracting such an event, and a relevant note on alternative public health resource like dentistry in time of a crisis.

Introduction

We live in an era in which billions of people strive to foster interaction, tolerance and understanding about the more destructive forces of war, violence and political chaos that marked the beginning of the 21st century. But terrorism has continued to plague the international security scenario. The issue of international terrorism as part of ' hybrid threats ' has been discussed at length in recent security conferences held in the Russian Federation over the past three months, with answers still to be sought. Several countries are seriously concerned about several new forms of security threats that were described in combination as "hybrid threats," i.e. threats using military and non-military methods, including bioterrorism, social media radicalization, cyber attacks, fake news, color revolutions, international regime change efforts, and terrorism.[1]

Among all these threats to security, the dark horse has been bioterrorism. The use of biological agents as weapons has been prevalent throughout history to disrupt established structures, such as governments and particularly large urban populations. In addition, the problem of bioterrorism has become more critical due to the ICT (Information and Communication Technology) revolution. Researchers have characterized the next hundred years as the "century of biology." Incredibly rapid and significant developments have been made in genetic modifications in bio-molecular technology and improved bio-producing technologies. Nevertheless, being a dual-edged sword, technology will make it easier for sinister actors to resolve obstacles in the past that prevented the development of biological weapons.[2]

Owing to the increasing threat of bioterrorism, the medical fraternity will contribute valuable assets to the preparation for and in the immediate response to a bio-disaster and its aftermath, both in personnel and facilities. Within the result, these properties must make a major difference.[3] Bioterrorism redefines the reactions of the medical fraternity to disasters. Correct and substantial information provided by credible public health and physicians to the general public will do much to alleviate their fears and encourage their cooperation and involvement in constructive, organized community response efforts. Within the emergency response to a major bioterrorism attack, the dental profession can also play a major role. Bhatt et al[4] did a study to evaluate the knowledge of undergraduate and postgraduate dental students about bioterrorism. Results of the study showed that there was little knowledge among dental students about bioterrorism and its management. Although, an encouraging sign was a strong willingness to provide support in both groups during an assault.

Preparedness of Medical Fraternity and Public Health

Based on scientific calculations, the World Health Organization (WHO) estimated potential casualties following the release of 50 kg of dried anthrax powder in a city of 500,000 inhabitants by aerosolisation for 2 hours. It was calculated that there would be 95,000 deaths, with 125,000 people being disabled. The strain on medical resources would be tremendous, resulting in bed requirements for 12,500 people (10% of those with disabilities), antibiotics for 125,000 people for 60 days, and 95,000 deaths being disposed of. This would almost certainly lead to a rapid deterioration in health and civil infrastructure services. For the defense of public health against bioterrorism, improved awareness and preparedness in unexplained diseases are critical. A more sophisticated and integrated public health response is needed in the scenario of a biological threat, requiring the assessment of the outbreak by prompt methods of disease surveillance and accurate laboratory diagnosis and characterization of the biological agent enabling prevention and treatment protocols to be implemented. Preparation also needs increased public health capacity to store adequate resources, including medications, vaccines, prophylactic medicines, chemical antidotes, personal protective measures such as gloves, helmets, etc., and equipment that may be required in an incident involving bioterrorism. First responders should be qualified in disease identification, techniques for biological mass casualty hospital, methods for preventing pathogens, and decontamination. The keystones for emergency public health response should be the aggressive treatment of illnesses, isolation, quarantine, enforcement of travel restrictions on the affected individuals, safe handling of the deceased victims and public awareness of the incident. Public health systems need to be strengthened in order to achieve enhanced monitoring and epidemiological capacity to detect the emerging disease and provide the relevant information that emergency medicine professionals need to respond to a bioterrorism attack. The emerging trends in disease can be recognized by public health professionals and appropriate prevention and control strategies can be implemented. Institutions that possess, use, receive, transfer or have access to, or receive, certain selected biological agents and toxins should be tracked for the handling and storage of these substances. Dealing with chemical, microbial, radiological and nuclear threats should be "an integral part of every health care professional's teaching and learning curriculum. Then in any medical event, epidemiologists, dentists, physicians, clinical microbiologists and laboratory personnel can

always be the first active emergency responders to classify the initial cases and collaborate with medical professionals.[5]

Arguments based on the premise of low doctor-population ratio were used to initiate multiple programs in public health, especially in the areas of human resource development. According to the facts presented in the literature, India has reached a doctor-population ratio of 1:1000 of the WHO standard. The health system has shifted from "not available" to "available but not engaged" status or "available but inefficient and maldistributed."[6] Nonetheless, the question remains whether this amount is appropriate to combat a bioterrorism event and whether or not alternative health practitioners will increase the number of workers. The native demands can be large and immediate in a major bioterrorist attack. When hospitals are crowded, there may also be a need for alternative sites to provide health care, and dental offices can meet that need.

Role of Dentist in Strengthening the Disaster Response Capacity

Dentistry can contribute valuable assets to plan for and in the immediate response to a bioterrorist attack and its aftermath, both in staff and services. It is important to inform the dental community on the medical and oral manifestations of diseases arising from a bioterrorist attack. Formal plans for an associated coordinated response by dental staff should be created, incorporated into the response arrangement of each group, and practiced sporadically just in case of associate attack. Dental offices fitted with certainly valuable instrumentation will be able to act as regional auxiliary hospitals if the need arises. As part of the dental school information, educational programs that provide information on potential biological weapons should be developed along with continuing education courses.[7]

It is necessary to develop up-to-date sources of knowledge that will be quickly accessed throughout the associated attack and reference materials to be distributed for PRN use. Such simple references should be able to provide dentists with sufficient knowledge of the specific agent used in an associated attack to modify them in order to respond effectively.

Dentists are in daily contact with the general public. Armed with data and connected to science-based sources of information about agents that will be used in a terrorist act, dentists can educate their patients and may affect public knowledge as a whole. There may also be a need for advanced teaching programs for threat communication. Dental offices are located in any given community and have several of the resources available to hospital facilities: sterilization equipment, air and gas lines, suction equipment, radiology capabilities, tools and needles. They will be referred to as "mini-hospitals" when native hospital facilities are inundated or when patient concentration is to be avoided, as in attacks involving contagious agents. For materials to be distributed in the event of an attack, pre-designated dental offices could act as stockpile site.[8]

The key to triple-crown planning for a good response to a serious terrorist attack is that it is planned and checked by performing simulated attacks and creating a plan that is incorporated into the disaster response of each city.

a) Assistance during an attack

The help that dentists and other dental workers can provide during the first few days of a potential bioterrorist attack may vary depending on the community's needs and available resources. These can range from packaging medicines in individual doses to providing a significant portion of primary

medical care in a quarantined area if doctors are unavailable because they have become disabled or died.

b) Surveillance and Notification

Disease surveillance systems are critical not only to detect an outbreak initially but also to monitor the extent and spread of the outbreak and to determine when it is over. Managing a large outbreak would require gathering information from contact tracing and exposure source investigations, as well as information on critical medicine, medical equipment availability as well as managing corpses.[9]

Since there is an incubation period before the clinical manifestations of diseases used as weapons in bioterrorist attacks become evident, it may be difficult to recognize the actual perpetration of an attack. Dentists can serve as an excellent surveillance resource as they can detect and report to public health authorities characteristic intraoral or cutaneous lesions when they are present. These may also be able to detect irregular trends of the cancellation or missed appointments of staff or patients that cannot be explained by known local circumstances. Such incidents may well be a precursor to serious events that are about to occur.

c) Diagnosis and Monitoring

In addition to assisting in the early identification of the disease or disease introduced in a bioterrorist attack, dentists can provide an individual patient diagnosis by observing the physical and behavioral signs that people manifest when the nature of the attack is determined. Salivary swabs can provide important information on diagnosis or treatment and can be obtained by dentists for laboratory tests to determine diagnosis when appropriate or to track patient progress.

d) Referral

Dentists can refer suspicious cases for confirmation, treatment or both to the appropriate specialists. Immunizations, triage facilities, increased medical care, decontamination and control of infections are key arenas to work on.

The Way Forward

Bioterrorism is a topic of serious discussion. The country should target measures aimed at enhancing public health in various areas of medical specialty like dentistry, along with microbe identification, police education, as well as generic antimicrobials to beat drug resistance. Education can enhance society's power to fight 'regular' infectious disease outbreaks and mitigate the outcome of bioterrorism attacks. The ongoing exposure of the biological coercion risk is an opportunity to evaluate our collective capacities and explicitly identify weaknesses and vulnerabilities. The government's proactive measures to ensure a wider range of security measures and empower the health sector in such a case of disaster management are crucial. The number of well-equipped emergency units and the number of people with the expertise to handle is still questionable and should be addressed.

A careful analysis of the unpreparedness consequences provides a basis for change. For longer-term solutions, India's medical profession should educate each of the general public and policy makers on biological terrorism and build a global agreement that not only condemns its use but also encourages preventive and dominant measures.

Dentists will provide their patients and communities with valuable service by providing quality information about the

potential for attacks, what to look for, and how to effectively respond to an attack. Bioterrorism preparation should be added to the dental curricula to overcome the gap of knowledge and willingness. Continuing Dental Education (CDE) programs must also be focused on bioterrorism in order to improve knowledge and develop bioterrorism management skills.

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China's Military Pursuit of Bio-Technology

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Summary

War has largely remained confined to the inanimate realms of land, air, space, etc. It is envisioned that it would cross over to the animate realm consisting of the human neuro-psychiatric system. This process would be aided by the cutting-edge developments in Science and Technology. The future battlefield is likely to consist of man-machine interfaces and bio-crossing technologies, especially Biotechnology, are expected to play a major role in it. This paper looks at China's military pursuit of Biotechnology, especially employing the CRISPR-Cas 9 technology, and why the Biotech industry has become a strategic industry for China.

Developments in science and technology (S&T) impact both the character and nature of warfare profoundly. New innovations are turning out to be disruptive and any military which takes the lead in absorbing the same would have a significant, perhaps decisive, edge over others.

The Chinese Defence White Papers reiterate the importance of powerful and modern armed forces in achieving the 'Chinese Dream'. True to this, China has taken giant steps towards modernising and transforming its armed forces. It has moved from Civil-Military Integration to Military-Civil Fusion so as to exploit the latest developments in S&T for advancing its military capabilities. In fact, President Xi Jinping heads the Central Commission for Military-Civil Fusion Development established in 2017. In Shenzhen, the Central Military Commission Science and Technology Commission has established the National Defense Science and Technology Innovation Rapid Response Group to 'promote the integration of military and civilian development in the field of science and technology and to use advanced commercial technology to serve the military.'[1] The second round of military reforms China implemented, helped in syncing the doctrine-writing done by the Academy of Military Science (AMS) with the new, S&T-driven capabilities. Such is the emphasis on S&T that Chinese Communist Party committees have been planted into more than 35 Chinese technological companies to ensure oversight![2]

He Fuchu of the Academy of Military Medical Sciences (AMMS), Beijing, sees bio-crossing technologies as tools which will make 'biological weaponization' possible and indeed, as the battlefield has continued to expand in the inanimate realm from the land

to the sky, sea, space, networks, etc., the animate realm consisting of human cells and cognitive abilities (the neuropsychiatric system) would become the next frontier for the battlefield to cross.[3] This is exactly the thought that is guiding the Chinese pursuit of 'zhishenquan' or 'command and superiority in the bio-domain' as they expect "a series of biological revolutions with 'smart' as the core."[4] In fact, way back in 2010, Guo Jiwei of the then Third Military Medical University (Army Medical University post the military reforms in 2017) co-authored a book titled 'War for Biological Dominance' examining the military impact of Biotechnology.[5] Bio-crossing technologies, especially Biotechnology, are being pursued so that China can 'seize the initiative' in this field.[6]

Is the People's Liberation Army (PLA) involved in research pertaining to the enhancement of human cognitive abilities through gene-editing, use of drugs, etc.? In 2011, the AMMS unveiled Night Eagle, a drug it claimed would help its troops remain awake for up to 72 hours with minimum cognitive degradation.[7] A company by the name Cogrowth is using artificial intelligence (AI) to interpret brain signals, which may, in future, be the basis for weapons being controlled by the power of thought![8] Furthermore, in 2015, He Fuchu of the AMMS, postulated that advances in biotechnology could lead to the creation of 'cerebrum control' weapons.

Clustered Regularly Interspaced Short Palindromic Repeats-CRISPR associated protein 9 (CRISPR-Cas 9) technology is one area where China has made massive strides. China has carried out CRISPR-Cas 9 experiments on a number of animals such as dogs, mice, rats, pigs, and rabbits. In fact, the world's first gene-edited dogs - Beagles named Hercules and Tiangou - were created in China.[9] Liangxue Lai, the researcher behind this project, mentioned that these dogs had potential police and military applications owing to their highly muscular body and better running ability.[10]

With so many CRISPR trials on animals, there is speculation that this technique is being used to study the enhancement of cognitive abilities. In fact, even as bioethicists and other stake-holders debated the issue of CRISPR trials on humans, China became the first country to carry out the same in 2016.[11] Dr Lu You of Sichuan University introduced gene-edited T-cells into the body of a lung cancer patient. Moreover, gene editing to confer resistance to Human immunodeficiency virus (HIV) was carried out on human embryos disregarding bioethics, and the first gene edited humans, named Lulu and Nana, were born in China in 2018.[12] It is pertinent to mention here that experiments in animals have shown that removing the gene linked to HIV pathogenesis - CCR5 - also enhances cognitive abilities.[13] Was this a deliberate move by China to study the enhancement of cognitive abilities in humans? It apposite to mention here that in 2016, an AMS researcher presented a doctoral dissertation titled 'Evaluation and Research on Human Performance Enhancement Technology'. It viewed CRISPR one of the three 'human performance enhancement technologies' and as the next 'disruptive technology' where China must take the lead.[14] Of the 14 cancer-related, CRISPR trials currently underway in China, the medical establishments of the PLA, especially the PLA General Hospital and the AMMS are involved in five![15]

It is noteworthy that by way of academic engagements and partnerships with foreign companies and academic institutions, the Chinese biotech companies have not just benefitted in terms of technical expertise, but also collected clinical and genetic data of foreign citizens.[16] This big data would not

only help incorporation of AI into medical biotechnology, but could also be used offensively as the data would reveal the genetic vulnerabilities of specific populations. China, in fact, places immense importance on data localisation and legally protects data by means of the Cyber Security Law (2017), Personal Information Security Specification (2018), etc.[17, 18]

Biotechnology is a critical dual-use technology offering a possible strategic depth and ensuring economic and health security in China. Over 10 crore people in China are diabetic and a quarter of the new global cancer cases are from China.[19] This is an area where China's domestic Biotechnology industry could play a critical role, reducing China's dependence on costly, imported medicines and patents and CRISPR-Cas 9 technology could provide a possible cure for such diseases. Hence, China has encouraged the growth of the Biotech industry by means of programmes and policies for attracting/ retaining human talent, providing infrastructure such as biotechnology parks and demonstration zones, concessions, legal support, etc.

Chinese advancement in the field of healthcare is likely to benefit the entire mankind. But it is the possible, offensive, military use which is a cause of concern.

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Chemical Concerns: Raising Suspicion About Myanmar's Covert CW Capability

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Summary

Myanmar has once again faced accusations of having a clandestine chemical weapons capability and non-compliance, despite the country's efforts to fulfil its obligation under the Chemical Weapons Convention. Even though Myanmar has rejected the latest US allegations, the questions regarding its intact and existing buildings at Tonbo Site and the suspicions about a clandestine chemical weapons factory in Pauk Township will haunt the authorities in Myanmar to come clean before the International community.

In late November 2019, the US representative Thomas DiNanno raised Myanmar's non-compliance with the Chemical Weapons Convention (CWC) in a statement to the 24th CSP (Conference of State Parties) at the Organisation for the Prohibition of Chemical Weapons (OPCW) in the Hague (Netherlands). DiNanno, who is the Deputy Assistant Secretary of State for Defence Policy, Emerging Threats, and Outreach in the Arms Control, Verification and Compliance Bureau at present, said that the South East Asian nation has failed to declare its past chemical weapons programme and failed to destroy its chemicals weapons production facility.

There is no clear evidence to suggest that Myanmar has a chemical weapons (CW) programme at present, although there were allegations in the past about it. Myanmar (erstwhile Burma) signed the CWC in 1993, an international treaty that outlaws the production, stockpiling and use of chemical weapons. The Myanmar government ratified the treaty after almost two decades in July 2015 to become 191th member of the CWC. At that time, Myanmar's Foreign Minister Wunna Maung Lwin in his address to the Executive Council of the OPCW had said in clear terms that his country is committed to fulfilling its obligations under the Convention and would cooperate with other State Parties to bring about a world completely free of chemical weapons.[1] He had blamed domestic circumstances and capacity constraints for the 20-year delay in ratifying the treaty.

However, the basis of the recent US position on Myanmar stems from the controversial chemical weapons capability and its past weapons programme. Evidently, Myanmar had a sulphur mustard development programme among other suspicious CW

agents in the 1980s and that the US thinks the country may still have a chemical weapons stockpile at its old chemical weapons facility. According to the US Myanmar may have CW agent and past production equipment intact at its past CWPF (Chemical weapon production facility) in Tonbo, located South-East of the national capital, Naypyidaw (Nay Pyi Taw). Besides the historical CW program at Tonbo, the US also suspects that there may be a couple of CW sites, Myanmar has never disclosed.[2]

The United States has at regular intervals conveyed its concerns to the government of Myanmar and the powerful military, since 1991. Also, Myanmar's military junta was blamed for alleged chemical attacks against anti-government Karenni ethnic rebels in February 2005.[3] Besides, there were also several allegations regarding Myanmar's secret CW arsenals.[4]

These past allegations and unverified suspicions notwithstanding, two major events in the last decade have aroused suspicion about Myanmar's existing industrial capability and willingness to use or produce CW having covert CW facilities. In November 2012, anti-riot police used white phosphorus (WP) agents against civilian protesters at the Letpadaung mine (the Monywa copper mining complex) in Sagaing.[5] The large scale use of WP, which is not listed as chemical weapon agent under the CWC or prohibited by any other international treaties, inflicted serious burn injuries on the protesters. This incident was criticised by the US State department at that time. The then State Department Spokeswoman Victoria Nuland urged Myanmar government to exercise restraint and discouraged to use chemical agents such as WP as a crowd control measure. She was quoted as saying, “We have opposed the use of phosphorus as a crowd control agent [...] and this phosphorus ... can be quite damaging to humans. There are other crowd control elements that are better suited.”[6] The WP instance though did not confirm anything related to CW capabilities of Myanmar, it raised suspicion about its chemical industry, production capacity and covert foreign suppliers. Also, the prevalent intent of powerful military regarding the use of chemical agents in the guise of riot control against civilians or dissenters.

Myanmar's military came under international scanner for alleged chemical weapon stockpile in early 2014 when five local journalists were sentenced to rigorous imprisonment for writing an article accusing the military of producing chemical weapons secretly. The report titled “A secret chemical weapon factory of the former generals, Chinese technicians and the commander-in-chief at Pauk Township” published in a weekly news journal 'Unity' was about a chemical weapons factory in Pauk Township, Magwe Division. The report that contained photographic details and residents' remarks stated that the factory frequented by top military and political officials may be producing chemical weapons. The factory was built in 2009 on more than 3,000 acres of land that was confiscated from farmers, and that it was connected by over 1,000 feet of tunnels.[7] However, the Myanmar government rejected the chemical weapon aspect of the report as 'baseless' but accepted that it was 'just a defence-related factory and protected under the Official Secrets Act.[8] Unfortunately, these two incidents were overlooked by the OPCW, as there is no evidence to suggest that the organisation took cognizance of these events.

The much open statement at the OPCW in November 2019 was not the first time that the US cited Myanmar's name for having a clandestine chemical weapons capability. In February 2019, the US urged Myanmar to declare its past programme to the OPCW,

remove this potential proliferation issue, and come into compliance with the CW Convention.[9]

Myanmar's military since then has rejected the US claims of any clandestine chemical weapon stockpile in its secret arsenals. The military (Tatmadaw) spokesman Brig. Gen. Zaw Min Tun summarily rejected that Myanmar ever had a CBRN programme and clarified to the media that the military hasn't had any programme relating to chemical weapons before or after the country's ratification of the CWC. To note, Myanmar ratified the CWC in 2015. If US claims are true and both Tonbo and Pauk Township facilities are covertly operational, then Myanmar is breaching its treaty obligations.

The CWC and the OPCW, now over two decades 'Young', have achieved many laurels only because of the most noble purpose - 'to make the world free of chemical weapons.' However, the threats and challenges posed by 'insincere' Nation States and of course by terrorist groups, remain unchanged and would possibly continue to be so in the future too, posing hard challenges for both the OPCW and the international community.

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Chemical and Biological News

NATIONAL AND INTERNATIONAL DEVELOPMENTS

U.S. Concludes Syria Used Chemical Weapons in May Attack

Lara Jakes, 26 September 2019

The United States has recently concluded that chlorine gas was used in an attack by Syria against rebels last May. It was the most recent instance of the use of chemical weapons by President Bashar al-Assad's government in the eight-year civil war but stopping short of threatening a military response.

Secretary of State Mike Pompeo warned Mr. Assad's government that "we're going to do everything we can reasonably do to prevent this kind of thing from happening again."

But he said that chlorine attacks amounted to a "different situation" than the suspected use of sarin, a nerve agent, that killed 80 people and provoked missile strikes against a Syrian air base by the Trump administration in April 2017.

One year later, in April 2018, at least 40 people died in a chemical attack that may have involved sarin or chlorine - or possibly elements of both. That galvanized the United States, Britain and France to launch airstrikes against Syrian chemical weapons storage facilities and military depots.

The May 19 rocket attack by the Syrian government near Latakia Province in northwest Syria wounded several civilians. It was "the latest instance in a long pattern of Assad's chemical weapons attacks that have killed or wounded thousands of Syrians," Mr. Pompeo said at a news conference in New York, where he was attending the United Nations General Assembly.

"The United States will not allow these attacks to go unchallenged, nor will we tolerate those who choose to conceal these atrocities," he said.

Asked how the United States would respond, Mr. Pompeo struck a measured tone. He noted that it took intelligence officials four months to confidently conclude that the attack was a chemical weapons strike and said, "This is different in some sense in that it was chlorine, so it's a bit of a different situation."

The production and possession of chlorine is not banned by the Organization for the Prohibition of Chemical Weapons. But it is illegal when it is used as a weapon of war. In 2013, Syria signed an international treaty banning the use and production of chemical weapons and agreed to eliminate its stockpiles. But Mr. Pompeo said the government in Damascus has violated it every year since, and he announced that the United States would provide the O.P.C.W. with an additional $4.5 million for its investigations in Syria.

Also, the Treasury Department imposed economic penalties against a subsidiary of a Russian shipping company, three of its executives, and five vessels accused of evading American sanctions to deliver jet fuel to Russian forces in Syria who are assisting Mr. Assad's government. The Russian shipping company, Sovfracht-Sovmortrans Group, faced sanctions in 2016 for operating in Ukraine.

Source: https://www.nytimes.com/2019/09/26/world/middleeast/syria-chemical-weapons-us.html

Salmonella detected in an Indian Masala brand MDH

12 September 2019

The U.S. Food and Drug Administration (USFDA) found the Salmonella bacteria in three batches of MDH's sambar masala.

The three lots with lot code 108, 47 and 48 have been manufactured by R-Pure Agro Specialities, sold by House of Spices (India) and was distributed in northern California retail stores, USFDA said in a release.

This product was tested by FDA through a certified laboratory to be positive for Salmonella, USFDA added in the release. It has now urged consumers to return the contaminated masala packets to the place of purchase for a full refund.

MDH, ubiquitous in Indian kitchens, is known for selling various spice mixes that are key to Indian cooking. "The recall was initiated after it was discovered by the FDA that the salmonella contaminated products were distributed," the statement said. It was not immediately clear if the recall was voluntary, or what the source of the contamination was.

Consumption of food contaminated with Salmonella can cause salmonellosis, one of the most common bacterial foodborne illnesses. The most common symptoms of salmonellosis are diarrhea, abdominal cramps, and fever within 12 to 72 hours after eating the contaminated product. The illness usually lasts 4 to 7 days, the USFDA has warned.

Source: https://economictimes.indiatimes.com /industry/cons-products/food/usfda-finds-salmonella-bacteria-in-mdh-sambar-masala/articleshow/ 71076094.cms

Resale of banned Glyphosate herbicide in Punjab Raises Concern

6 September 2019

In October 2018, government had banned the sale of herbicide Glysophate because of adverse health effects including cancer and liver disease. However, it has been found that Chemicals are still being sold by an e-commerce company. Showing an evident disregard of the law.

Monsanto, recently bought by Bayer, is the biggest manufacturer of the herbicide across the world. Thousands of people who have become sick after using the chemical have filed cases against the company for failing to warn them of the harmful effects. The court in San Francisco had awarded USD289 million to a petitioner DeWayne Johnson.

Source: https://timesofindia.indiatimes.com /city/amritsar/farm-panel-chief-raises-concern-over-sale-of-banned-glyphosate-herbicide/articleshow/71004584.cms

First Ever Ebola Vaccine Discovered

18 October 2019

A major milestone for WHO (World Health Organisation) as the first ever vaccine has been discovered. The European Medicines Agency (EMA) announcement recommending a conditional marketing authorization for the rVSV-ZEBOV-GP vaccine, has been shown to be effective in protecting people from the Ebola virus. The European agency responsible for the scientific evaluation of medicines developed by pharmaceutical companies, is a key step before the European Commission decision on licensing. In parallel, WHO will move towards prequalification of the vaccine.

"The conditional authorization of the world's first Ebola vaccine is a triumph for public

health, and a testimony to the unprecedented collaboration between scores of experts worldwide," said Dr Tedros Adhanom Ghebreyesus, WHO Director-General. "My deepest gratitude is to the studies' volunteers, researchers, health workers in Guinea, other countries and the Democratic Republic of the Congo who have put themselves at risk to ensure people are protected with this vaccine."

In the past five years, WHO has convened experts to review the evidence on various Ebola vaccine candidates, informed policy recommendations, and mobilized a multilateral coalition to accelerate clinical evaluations. The EMA review was unique in that WHO and African regulators actively participated through an innovative cooperative arrangement put in place by WHO, which will help accelerate registration for the countries most at risk.

A randomized trial for the vaccine began during the West Africa Ebola outbreak in 2015. When no other organization was positioned to run a trial in Guinea during the complex emergency, the government of Guinea and WHO took the unusual step to lead the trial.

A global coalition of funders and researchers provided the critical support required. Funders included the Canadian Government (through the Public Health Agency of Canada, Canadian Institutes of Health Research, International Development Research Centre, Global Affairs Canada); the Norwegian Ministry of Foreign Affairs (through the Research Council of Norway's GLOBVAC programme); the Wellcome Trust; the UK government through the Department for International Development; and Médecins Sans Frontières.

The trial was successfully run using an innovative ring vaccination design. In the 1970s, this ring strategy helped to eradicate smallpox, but this was the first time that an experimental vaccine was evaluated this way.

Background

Ebola virus disease (EVD) emerged at unprecedented epidemic levels in West Africa in 2014. Whereas previous EVD outbreaks were contained fairly quickly, this epidemic spread to crowded urban areas where transmissions continued unabated for many months. Retrospective analysis indicates that the first case of the disease may have occurred at the end of 2013. An 18-month-old boy in a small village in Guinea became ill and died in late December, and the disease began to spread. It wasn't until late March 2014 that the disease-causing agent was identified as Ebola virus. Through the fall of 2014, the epidemic was ongoing in Sierra Leone, Guinea, and Liberia. Nigeria and Senegal had small outbreaks related to importations from neighboring countries, but public health authorities there were able to contain spread of the disease. Several cases and deaths were reported from Mali, but spread was limited. In total, by the time the epidemic was over in March 2016, 11,325 confirmed, probable, and suspected deaths occurred. Total EVD cases numbered 28,652.

Transmission of the disease was limited to West African countries, with the exception of several transmissions in healthcare settings in Europe and the United States. Two U.S. nurses and one Spanish nurse became ill from contact with patients who acquired the disease in West Africa. The nurses recovered.

Ebola virus disease has no cure, but supportive care in a hospital setting can increase a patient's chance for survival. Additionally, plasma transfusions from convalescent patients and an experimental antibody preparation have been used to

treat certain patients. It is not possible to say at this time whether these treatments have had an effect on the course of the disease in the patients who received them.

Source: https://www.who.int/news-room/detail/18-10-2019-major-milestone-for-who-supported-ebola-vaccine

https://www.historyofvaccines.org/index.php/content/articles/ebola-virus-disease-and-ebola-vaccines

Biochemist and a notorious terrorist freed in Malaysia

21 November 2019

Convicted Malaysian terrorist Yazid Sufaat, who acquired 4 tonnes of ammonium nitrate in 2000 in preparation for a foiled bombing plot in Singapore, has been freed from prison. The 55-year-old US-trained biochemist, who once attempted to produce weapons of mass destruction for Al-Qaeda, was released from Simpang Renggam Prison, two years after serving the maximum period allowed under the Prevention of Terrorism Act (Pota). "He will be under police surveillance for two years and will need to wear an electronic monitoring device (EMD). If he wishes to travel outside of Ampang, Yazid would need to alert the Ampang police chief," Datuk Ayob (Malaysian police counter-terrorism chief Ayob Khan Mydin Pitchay) said, referring to a district in Selangor state, where Yazid is residing.

Mr Ayob added that although Yazid is allowed to use a phone, he is barred from having any access to the Internet.

"He's also not allowed leave home between 8pm and 6am but is free to accept visitors. After two years, the authorities will re-evaluate everything again before deciding," he said.

Source: https://www.straitstimes.com/asia/se-asia/malaysian-terrorist-with-9-11-links-released-on-electronic-tagging-device

https://www.businessinsider.my/malaysia-has-freed-a-terrorist-notorious-for-making-biological-weapons-heres-what-we-know/

Lyme Disease or Military Weapon?

Aristos Georgiou, July 2019

One of the books that Smith refers to-called Bitten: The Secret History of Lyme Disease and Biological Weapons-was published earlier this year, authored by Stanford University science writer and former Lyme suffer Kris Newby. It features interviews with late Swiss-born scientist Willy Burgdorfer-the man credited with discovering the bacterial pathogen that causes Lyme disease-who once worked for the DoD as a bioweapons specialist.

"Those interviews combined with access to Dr. Burgdorfer's lab files suggest that he and other bioweapons specialists stuffed ticks with pathogens to cause severe disability, disease-even death-to potential enemies," Smith said during the debate on the House floor.

"With Lyme disease and other tick-borne diseases exploding in the United States-with an estimated 300,000 to 437,000 new cases diagnosed each year and 10-20 percent of all patients suffering from chronic Lyme disease-Americans have a right to know whether any of this is true," he said. "And have these experiments caused Lyme disease and other tick-borne diseases to mutate and to spread?" Smith asked.

Despite the passing of the recent bill (requiring the Inspector General of the

Department of Defense (DoD) to conduct a review into whether the Pentagon experimented with ticks and other blood-sucking insects for use as biological weapons between 1950 and 1975) by the House, the American Lyme Disease Foundation's (ALDF) Phillip Baker says Smith's claims are unfounded and continues to state it as unfounded conspiracy theory. There were epidemics of Lyme disease but they were due to reforestation, suburbanization and a failure to manage deer herds.

Source: https://www.newsweek.com/pentagon-weaponized-ticks-lyme-disease-investigation-1449737

https://www.newsweek.com/pentagon-weaponized-ticks-lyme-disease-investigation-1449737

The Army biowarfare lab that tests pathogens like Ebola reported 2 containment breaches this year

Heather Mongilio, 25 November 2019

The Army's premier biological laboratory on Fort Detrick reported two breaches of containment earlier this year, leading to the Centers for Disease and Control halting its high-level research.

The U.S. Army Medical Research Institute of Infectious Diseases announced Friday that it would restart its operations on a limited scale. As it works to regain full operational status, more details about the events leading to the shutdown are emerging. An inspection findings report, obtained by the News-Post through a Freedom of Information Act request, details some of the observations found during CDC inspections as well as by USAMRIID employees who reported the issues.

The two breaches reported by USAMRIID to the CDC demonstrated a failure of the Army laboratory to "implement and maintain containment procedures sufficient to contain select agents or toxins" that were made by operations in biosafety level 3 and 4 laboratories, according to the report. Biosafety level 3 and 4 are the highest levels of containment, requiring special protective equipment, air flow and standard operating procedures.

Due to redactions to protect against notification of the release of an agent under the Federal Select Agent Program, it is unclear the result of the two breaches. Breach is a "loaded word," said Col. E. Darrin Cox, commander of USAMRIID. While there was a breach, there was no exposure, he said. No one was exposed to any of the agents or toxins. Anytime USAMRIID determines there is a breakdown of requirements, employees have to do a report, Cox said.

What went Wrong

The CDC, in its inspection findings, noted six departures from the federal regulations for handling select agents and toxins. One of those departures was the two breaches.

Another departure was that the military laboratory systematically failed to implement biosafety and containment procedures. In one instance, personnel deliberately propped open the door to the autoclave room while the employee removed biohazard waste.

“This deviation increases the risk of contaminated air from room [redacted] escaping and being drawn into the autoclave room, where individuals do not wear respiratory protection," according to the report.

The report includes a large section redacted to protect against the release of a report or inspection of a specific registered person that would endanger public health or safety.

Propping the door open was an "incident," Cox said, not one of the breaches. It was noted by the CDC during one of its inspections.

The person who propped the door open did not have mal intent, he said. "They weren't doing it to openly flout the rules," Cox said. "They were doing it for a reason that they thought was reasonable. But I mean, it still was not in compliance with [standard operating procedures]."When the breaches were reported, USAMRIID's commander at the time issued a cease and desist to all work being done at the laboratory so that personnel could do a safety pause. It was a voluntary stop, Cox, who was not commander then, said.

Source: https://taskandpurpose.com/army-fort-detrick-containment-breaches

Blackberries are a probably the Cause of Hepatitis A Outbreak in the US

Tom Karst

3 December 2019

The number of hepatitis A illnesses potentially linked to fresh conventional (non-organic) blackberries from the grocery store Fresh Thyme Farmers Market has increased. On 3 December 2019, the Centers for Disease Control and Prevention updated their case counts to 16 illnesses, with the most recent illness onset date on Nov. 15. On Nov. 26, the CDC had counted 14 illnesses in the outbreak.Illnesses in the multi-state outbreak have been reported in Indiana, Michigan, Minnesota, Missouri, Nebraska, and Wisconsin, according to a news release.

However, the release said traceback information to date shows that these berries came from a distribution center that ships fresh berries to Fresh Thyme Farmers Market stores in 11 states, including Iowa, Illinois, Indiana, Kentucky, Michigan, Missouri, Minnesota, Nebraska, Ohio, Pennsylvania and Wisconsin. "As this investigation continues, the FDA will work with our federal and state partners to obtain additional information during the traceback investigation and will update this advisory as more information becomes available," the release said.

The FDA is urging consumers to not eat any fresh conventional blackberries if purchased between Sept. 9 and Sept. 30 from Fresh Thyme Farmers Market stores in the 11 states receiving berries from the distribution center.Shoppers who purchased the fresh blackberries and then froze those berries for later consumption should not eat these berries and instead throw them away, according to the release.

An official statement from Fresh Thyme Farmers Market, issued Dec. 3, said that the FDA, the CDC, and several state agencies have contacted the chain about the outbreak affecting individuals in six states.

Fresh Thyme Farmers Market said in the statement that there is "no reason to believe that any of the product was contaminated via handling in our stores."

"In addition, the agencies are only concerned with product purchased between September 9 and September 30; product purchased or consumed outside of these dates are not subject to the investigation," the chain said in the statement. "We are working with these agencies to identify our suppliers and isolate the source of this contamination."

Source: https://www.thepacker.com/article/updated-hepatitis-outbreak-linked-blackberries-count-increases#:~:targetText=UPDATED%3A%20Hepatitis%20A%20outbreak%20linked%20to%20blackberries%20count%20increases,-Tom%20Karst&targetText=On%20Nov.%2026%2C%20the%20CDC,according%20to%20a%20news%20release.

Possible Carcinogen detected in Metformin

9 December 2019

After the presence of a carcinogen prompted recalls of several blood pressure medications and Zantac, the FDA is now looking into the possibility of the same carcinogenic impurity in a widely prescribed diabetes drug. Low levels of N-nitrosodimethlyamine (NDMA) have been found in metformin medicines in other countries. The medication is widely used to treat diabetes.

Some regulatory agencies outside of the U.S. have already started recalling metformin, but there are not currently any active metformin recalls in the U.S.

According to a release by the FDA, the levels of NDMA seen in metformin drugs abroad are within the range that is naturally occurring in food and water. The FDA is currently investigating whether the metformin used in the U.S. contains NDMA, and if it is present in levels higher than the acceptable daily intake.

NDMA is a common contaminant found in water, dairy products, vegetables and foods like cured and grilled meets. It does not cause harm when ingested at low levels, but may increase risk of cancer if one is exposed to it above acceptable levels over long periods of time.

Metformin is a prescription drug used to control high blood sugar in type 2 diabetes patients.

The FDA is urging people who use metformin not to discontinue taking the drug without talking to a health care professional. "These investigations take time," Janet Woodcock, director of FDA's center for Drug Evalaliatoin and Research said. "We understand that these issues affect patients' health and well-being in many ways, and the FDA's goal is to provide patients and health care providers as much clarity and as many answers as possible to inform their health care decisions."

Source: https://www.wthr.com/article/fda-probes-diabetes-drug-metformin-possible-carcinogen

DISARMAMENT

Boston Is Using a Chemical Warfare Device To Help Fight Fentanyl

Martha Bebinger, 10 October 2019

MX908- a mass spectrometer, initially used by the military and the hazmat crews fighting bioterrorism or explosion, would be used to fight fentanyl. The machine can identify 70 specific types of fentanyl and alert users about the presence of more than 2000 not yet named fentanyl analogs. It also detects stimulants including cocaine and meth.

Drug checking offers an evidence-based warning for drug users, a warning that the Boston Public Health Commission can help spread.

So this improvement in consumer knowledge and confidence in what they're getting, and how to use it can improve the safety of the larger supply.

Source: https://www.wbur.org/commonhealth/2019/10/10/mx908-opioid-crisis-drug-testing

Finland's Chemical Warfare Drills To Have Real Lethal Gases

18 September 2019

The Pori Brigade, a unit of the Finish Army, will begin using actual chemical warfare agents during their defence trainings. The main idea behind this move is to equip

soldiers with the combat skills required in an authentic environment. This is the first in the history of drills, previously only substitute chemicals were being used. This defense training will be held in three hectares of land beginning in January 2020. Instructions on chemical warfare will also be provided to other authorities, according to the army.

The Finnish army has assured that while these chemicals are lethal to the humans and hazardous to the environment extra precaution would be taken to ensure that the drill poses no threat to either humans or the surroundings.

Till date, Finland has not used any Chemical substance that fall under the UN Chemical Weapon Convention. However, the Convention does allow the use of Chemical Weapons to be used in military exercises. An opportunity often exploited by many nations.

Source: https://www.defenseworld.net/news/25493/In_a_First__Finland___s_Chemical_Warfare_Drills_To_Have_Real_Lethal_Gases#.XabdTdIzbIU

https://sputniknews.com/military/201909181076829662-finnish-army-to-pioneer-real-mustard-gas-sarin-in-chemical-warfare-drills/

INTERNATIONAL COOPERATION

Chemical Industry and National Authorities Meet in Doha and Pledge Stronger Cooperation

OPCW News, 28 November 2019

Representatives from National Authorities and their chemical industry counterparts from 25 OPCW Member States met in Doha, Qatar, from 15-17 October 2019, for the Sixth Annual Meeting of Representatives of the Chemical Industry and National Authorities of States Parties to the Chemical Weapons Convention. A total of 44 international and over 20 national participants exchanged experiences and practices around the implementation of the industry verification regime.

In his opening remarks, the Chairman of the Qatar National Committee for the Prohibition of Weapons, H.E. Brigadier Hassan Saleh Al-Nesf, highlighted the significance of this annual meeting, stating that it "brings together representatives of two important pillars underpinning the optimal implementation of the Chemical Weapons Convention", referring to the National Authorities on the one hand and the chemical industry on the other.

The meeting agreed a final report, which summarised key elements of the national practices presented, as well as outcomes of group discussions on "risk-based approaches" to verification. The report also summarised the ideas generated around tools to support National Authorities' engagement with the chemical industry. The participants' diverse backgrounds, and their experiences of Article VI implementation enriched the discussion.

The meeting was organised with voluntary contributions of the State of Qatar and through close cooperation between the OPCW Technical Secretariat and the Doha Regional Centre for CBRN Training.

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experiences of Article VI implementation enriched the discussion.

Source: https://www.opcw.org/media-centre/news/2019/10/chemical-industry-and-national-authorities-meet-doha-and-pledge-stronger

Conference of the States Parties Adopts Decisions to Amend Chemical Weapons Convention Annex

OPCW News, 27 November 2019

The Chemical Weapons Convention (CWC), banning the development, production, use, stockpiling and transfer of chemical weapons, entered into force in 1997. Today, the Twenty-Fourth Session of the Conference of the States Parties to the CWC has adopted two decisions to amend for the first time the Annex on Chemicals to the Convention.

The two decisions adopted reflect proposals that were submitted in the context of an evolving threat from chemical weapons and their recent use, which require the OPCW to continually adjust its ability to respond. Such conditions have led to the need to update the Schedules of the Annex on Chemicals. The first decision was jointly proposed by Canada, the Netherlands, and the United States of America while the second decision was proposed by the Russian Federation. Both decisions call for Technical Changes to Schedule 1 of the Annex on Chemicals to the CWC.

The Director-General of the Organisation for the Prohibition of Chemical Weapons (OPCW), H.E. Mr Fernando Arias, recognised the importance of these amendments: "This is the first time in its history that the Chemical Weapons Convention's Annex on Chemicals has been updated. This is an important development that demonstrates the adaptability of the Convention to changing threats while enhancing the OPCW's ability to remain vigilant, agile, and fit for purpose."

The Annex on Chemicals includes three Schedules that list toxic chemicals and their precursors. For the purpose of implementing the Convention, these Schedules identify chemicals for the application of special verification measures according to the provisions of the Convention's Verification Annex.

As required under subparagraph 5(f) of Article XV of the CWC, the Director-General will notify all States Parties and the Convention's Depositary, the United Nations Secretary-General, of the decisions adopted by the Conference. This notification will include the merged text of the proposals, which will be prepared by the Secretariat for inclusion in the Annex on Chemicals. The changes to the Schedule of the Annex on Chemicals will enter into force for all States Parties 180 days from the date of the notification sent by the OPCW Director-General.

Source: https://www.opcw.org/media-centre/news/2019/11/conference-states-parties-adopts-decisions-amend-chemical-weapons

Indian experts to visit Afghanistan to further partnership under OPCW mentorship programme

27 November 2019

Addressing a conference of State Parties of the Organization for the Prohibition of Chemical Weapons (OPCW) on Tuesday, India's ambassador to the Netherlands and Permanent Representative of India to OPCW Venu Rajamony said India condemns the use of chemical weapons under any circumstances.

Further adding, he said that a team of Indian experts will soon visit Afghanistan to

advance the ongoing cooperation between the two countries under the world chemical weapons watchdog's mentorship and partnership programme. The Indian authorities have already shared knowledge, skills and experience with their Afghan counterparts in the first round of the programme which was held in New Delhi from April 29 to May 3 this year.

Source: https://economictimes.indiatimes.com/news/defence/indian-experts-to-visit-afghanistan-to-further-partnership-under-opcw-mentorship-programme/articleshow/72257408.cms?from=mdr#:~:targetText=Indian%20experts%20to%20visit%20Afghanistan%20to%20further%20partnership%20under%20OPCW%20mentorship%20programme,-PTI%20%7C%20Nov%2027&targetText=A%20team%20of%20Indian%20experts,watchdog's%20mentorship%20and%20partnership%20programme.

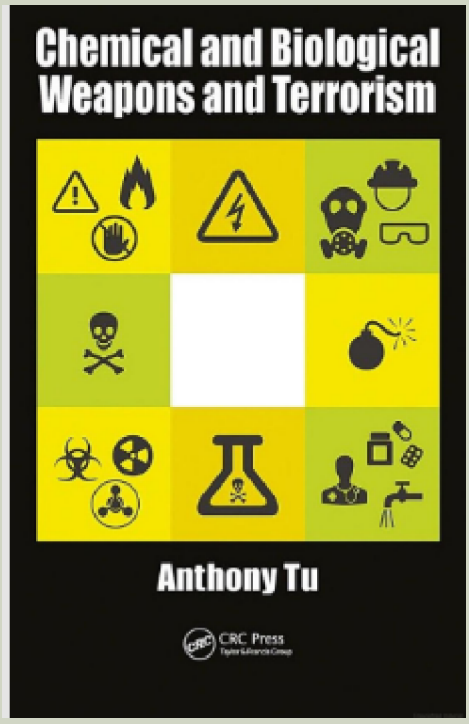
Book Review

Chemical and Biological Weapons and Terrorism

by Anthony Tu, London, CRC Press, Taylor and Francis Group, 2018, pp. 183, Rs 5444

Dr. Lakshmi Priya

The author is a Research Analyst at IDSA. She completed her PhD focusing on Syria from JNU and has a number of publications related to West Asia.



Toxic chemicals have been used for warfare purposes for thousands of years however first international agreement to limit the use of chemical weapons was signed by France and Germany in Strasbourg in 1675. Since then, numerous times poisonous chemicals ranging from temporarily debilitating tear gas to deadly Sarin gas have been used to defeat one's adversary. The most recent use of chemical weapons was reported in 2017 from the Syrian city of Douma in which 40 people were killed. The Organisation for the Prohibition of Chemical Weapons (OPCW) conducted an investigation and detected the use of "various chlorinated organic chemicals" while the Assad government denied the charges. In these circumstances, Chemical and Biological Weapons and Terrorism by Anthony Tu come as a breather for scholars interested in knowing about chemical and biological weapons.

Anthony Tu, who is Professor Emeritus at Department of Biochemistry and Molecular Biology, Colorado State University, tries to provide Bird's Eye view of CBW to the readers in this book. He begins the book explaining basic concepts like the difference between a chemical agent and a chemical weapon and goes on to list properties of various chemical agents including nerve gases, blister agents, blood agents and choking agents. Recipient of lifetime achievement award presented by Toxinological Society of India in 2013, Anthony Tu familiarizes the readers with the fact that humans, animals and crops can be damaged by micro organismic biological weapons, naturally occurring toxic weapons and by modified and genetically engineered toxins. Tu states that if an amino acid sequence of the protein is known, totally new toxins can be developed with the help of

genetic engineering (p. 31). Nevertheless, not every toxin can be used as a biological weapon. For a toxin to be used as a biological weapon it has to be easy to obtain, has high toxicity level, shall have stable nature, be easy to handle, be hard to detect, be hard to cure and should have the ability to become a stable aerosol (p. 31). Bacteria fulfills most of these conditions and that is why there are many precedents of Anthrax being used as a biological weapon. Small pox caused by Variola major has the potential to become one of the world's most dangerous biological weapon.

The author who received 'the order of the Golden Sun' by the Japanese emperor, describes incidents of use of CBW in the world including Anthrax attack in U.S., use of mustard gas and Sarin by Iraq against Iran, Halabja tragedy, use of Chlorine, Sarin and mustard gas by ISIS, use of chemical weapons in Syria, Sarin attack in Matsumoto and Tokyo subway Sarin attack in Japan. While elucidating the Sarin attack in Japan in chapter four, he provides a lucid description of the responsible Aum Shinrikyo Tibet Vajrayana Buddhist cult organization founded by Shoko Asahara. He explains in detail about its approved status in Japan, it's highly educated clientele, effective way of functioning, precision in executing the attacks and the role of the chemical scientist Masami Tsuchiya (p. 97). The author had an opportunity to meet one of the death row accused named Dr. Tomomasa Nakagawa (p.84) and he has used the garnered information to explain the attack. Towards the end, he has also explained the response of the Japanese government (p. 86) and the preemptive measures to avoid future attacks.

In this book, Tu mentions about the Chemical weapons program of India and says that India destroyed its stockpile of 1044 tons of Sulfur Mustard in 2009 as it is a signatory to Chemical weapon convention. He believes that it is highly unlikely that India is going to use chemical weapons, however, risk of theft or diversion of material by terrorists remains a genuine concern. India established the National Authority for chemical weapon convention which has a primary liaison to OPCW. Till now India has been twice accused of using chemical weapons, once by Pakistan in 1999 and second time by Israr Abbasi, an opposition leader in Azad Kashmir in 2000. India destroyed its chemical weapons after achieving nuclear capability. It is the third country to completely destroy its chemical weapon after South Korea and Albania (p. 161).

Anthony Tu cautions that a state should always be prepared against a chemical or biological attack. He firmly believes that the use of chemical weapons in large quantities can change the outcome of any war; the possession of chemical weapon has a deterrent effect and an analysis of used chemical weapon is important to administer the right antidote (p. 20). He also explains that transportation of chemical weapon can be hazardous and one way to safely transfer it is the use of binary system used by the U.S. He says that strict regulations and legal measures can be helpful in checking the use of the CBW by the state as well as non-state actors. Lastly, he advises that the use of radiation weapons and explosive agent like ammonium nitrate shall not be taken lightly.

To comprehend this book fully, one has to have a certain degree of pre-acquired basic understanding of science. Use of pictures, equations and tables makes it an interesting read while Tu enriches the readers by mentioning various important books on the topic. He has acknowledged the co-author of his third chapter Sayid Abbas Foroutan's contribution who gave him insightful information about Iran-Iraq war and Iran's

covert response. The book has been written in a narrative manner due to which there are avoidable repetitions, for instance, anthrax issue is repeated in p. 34 and 102. It would have been great if it was avoided. However such lucid and honest books are not written every day. This book is truly a delight for the reader who is looking for comprehensive knowledge about CBW.

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