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A JAPANESE BIOLOGICAL WEAPON'S LEGACY IN MALAYSIA: THE AFTERMATH EFFECTS FOR ENVIRONMENTAL CONTAMINATION, SUSTAINABLE DEVELOPMENT AND APPLICATION OF INTERNATIONAL HUMANITARIAN LAW

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Abstract: *Plague experimentation was conducted by the Japanese during World War II at an old mental hospital in Tampoi, Johor and a school in Kuala Pilah, Negeri Sembilan situated in Malaysia. Environmental contamination could be probable learning from past experiences in other countries that have experimented, tested and used biological weapons. This study's objective is to highlight environmental contamination matters arising from plague experimentation that the Japanese conducted which violates international humanitarian law and its implication for sustainable development. The methodology of this study is qualitative which merges the doctrinal research and socio-legal approaches in the context of analysing provisions of selected international humanitarian law agreements and secondary resources through a textual and content analysis. The results indicate the possibility of environmental contamination from the plague experimentation as some infected corpses of Japanese soldiers were buried while others were cremated. Present-day rats could be carriers of the particular plague strain with which the Japanese experimented. Only the Hague Conventions of 1899 and 1907, and customary international laws prohibiting biological weapons seem relevant to the Japanese experimentation of plague. In conclusion, Malaysian authorities need further information to delve into this matter deeply to enable remedial action to be taken.*

Keywords: *Biological Weapons, Sustainable Development, Kuala Pilah, Tampoi, Soviet Union, Gruinard Island, Panama, China, Tuanku Muhammad School, Bioterrorism, Biosecurit*

Introduction

A biological weapon's facility once located in an old mental hospital at Tampoi, Johor, and a school situated at Kuala Pilah, Negeri Sembilan during the Japanese occupation of then Malaya in World War II had been subjected to plague experimentation which may cause long-term

environmental contamination. Biological weapons are "complex systems that disseminate disease – causing organisms or toxins to harm or kill humans, animals or plants" (United Nations Office at Geneva (UNOG), 2009, p. 1). Biological weapons also consist of two elements, namely, a weaponised agent and a delivery mechanism (UNOG, 2009, p. 1). The consequences of using biological weapons include infection in humans, livestock and agricultural produce, causing food shortages, economic loss, environmental catastrophes, and widespread illness, while at the same time instilling fear and distrust among the general public (UNOG, 2009, p. 1). Environmental contamination refers to the "presence of hazardous substances or constituents that post unacceptable risks to the environment, humans, or ecological receptors" (Mississippi Department, 2007, p. 2).

Indeed, the testing and usage of biological weapons for armed conflict has, in the long term, devastating health effects besides causing environmental contamination against which decontamination efforts can be costly. In one of its reports, the United Nations (UN) Department for Disarmament Affairs indicated that "[t]he financing of armed conflicts can have a direct negative impact on sustainable development" (Department of Disarmament Affairs, 2004, p.18). Even Principle 24 of the Rio Declaration on Environment and Development (Rio Declaration) of 1992 reiterates that "[w]arfare is inherently destructive of sustainable development" (United Nations Environmental Programme (UNEP), 1992, p. 3). Principle 24 of the Rio Declaration elaborates that "[n]ations shall respect international laws protecting the environment in times of armed conflict, and shall cooperate in their further establishment" (UNEP, 1992, p. 3). The term sustainable development is most frequently quoted in the Report of the World Commission on Environment and Development (WCED) of 1987, better known as the Brudtland Report (World Commission on Environment and Development (WCED), 1987). In the Brudtland Report, sustainable development means a form of "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 87). Sustainable development consists of various components, namely, social, economic, and environmental objectives that are supposed to be complementary and interdependent of one another (Organisation of Economic Cooperation and Development (OECD), 2001, pp. 21-22). It is the environmental component of sustainable development that is emphasised in this study but more specifically in the context of experimenting, testing and use of biological weapons in armed conflict with devastating long-term effects on the environment that thereby require decontamination efforts.

Indeed there is a possible problem of environmental contamination caused by previous experimentation of plague by the Japanese soldiers at the old Tampoi mental hospital in Johor and Tuanku Muhammad School, Kuala Pilah during the World War II era that could have an impact for the present. Despite the need to address the possibility of environmental contamination at these facilities, Malaysian authorities lack the information about the past clandestine activities that took place in the past. This problem about lacking the necessary information on the past usage of these facilities has impeded Malaysian authorities from taking the necessary action to rectify the problem. A possible cause to the Malaysian authorities having the lack of information about the past clandestine activities at these facilities is attributed to their inaccessibility of historical documents from both the British and Japanese era in Malaya. As a consequence of this, for years Malaysian authorities have remained in the dark about the illicit activities of these facilities to delay further action to be taken to address any possibility of environmental contamination at the said sites. Therefore, there is the need for a qualitative study which relies on past documents, secondary resources and international humanitarian law instruments to highlight the illicit experimentation of plague by the Japanese before at these facilities that could possibly cause environmental contamination and also violate international

humanitarian law. This study could then shed light to the Malaysian authorities regarding the exact activities that transpired at the old Tampoi mental hospital and Tuanku Muhammad School during the Japanese era in enabling further steps to be taken.

Against this background, this study has the objective of highlighting environmental contamination issues that could have arisen from the Japanese experimentation with plague during World War II at the old Tampoi mental hospital in Johor and at the Tuanku Muhammad School of Kuala Pilah, Negeri Sembilan, which violates international humanitarian law. Also for the purpose of this study, both Malaya and Malaysia will be used interchangeably, with Malaya referring to the political entity that existed before Malaysia's formation in 1963 and the colonial occupation before Malaysia's independence in 1957 (1957: Malaya, 1957). In determining the forms of environmental contamination from the Japanese experimentation of plague, examples from the former Soviet Union, the United Kingdom (UK), the People's Republic of China (China), the United States (US), and Panama are highlighted to draw some useful lessons.

Literature Review

Within East Asia, extensive literature already exists on Japan's testing and usage of biological weapons in China during World War II (Fong, 2000; Galvin, 2003; Gold, 1997; Harris, 2002, 2003; Li, 1999, 2003; Tschuiya, 2005). With regard to Unit 9420, a biological weapon's facility being formed by the Japanese in Singapore and other Southeast Asian countries during World War II, there have been scholars who have elaborated on this matter but not in great detail about the situation in Malaya (Fong, 2000; Gold, 1997, pp. 50-51; Harris, 2003, p. 481-482; Ng, 1995; Sidhu, 1991, pp. 160-164; Tschuiya, 2005, p. 4). Only Ng (1995), in scant passing, has mentioned the old mental hospital of Tampoi, Johor, being used as a biological weapons facility without providing further details. This being the case, this study intends to fill in the gap left by these scholars, not only in terms of elaborating on the biological weapons facility in Tampoi, Johor, but additionally the Tuanku Muhammad School in Kuala Pilah which has been given sparse attention that was once used by the Japanese to breed and test animals with plague. There is an underlying concern that these facilities could possibly suffer from the environmental contamination in the long term.

Although it now seems so long ago that the Japanese experimented with plague at the old Tampoi mental hospital, and bred animals in their experimentation with plague at Kuala Pilah, it should not be discounted that there could be long-term environmental consequences as a result of experimenting with rats that subsequently could have been released. Should skeletons and tissues of Japanese soldiers infected with plague strains ever be found, testing through forensic Deoxyribonucleic Acid (DNA) could also indicate contamination. This study is important in its intention of alerting the Malaysian authorities and scientists of the need to further examine the past history of the Japanese biological weapons development programme in Tampoi, Johor, and Kuala Pilah, Negeri Sembilan so as to determine whether there is a possibility of environmental contamination from the aforesaid plague and whether this can be traced to existing rats (rodents) and skeletons of infected Japanese soldiers if they are ever found at the surroundings of the Tampoi mental hospital. This is crucial because if there is environmental contamination from traces of plague among rats and tissues of Japanese soldiers, decontamination efforts and other remedies have to be taken. Since the literature that elaborated on Malaysia being once a biological weapons facility during the Japanese colonial era is few and far between, this study can thus make timely a contribution in adding Malaysia to the list of countries where the Japanese once formed biological weapons facilities in Southeast Asia during World War II. Furthermore, an investigation into biological weapons facilities in

Malaysia in the context of environmental contamination and sustainable development may contribute to existing literature on disarmament and the environment.

Scholarly works regarding environmental contamination from testing and usage of biological weapons have also been emphasised by certain scholars (Al-Duaij, 2002; Choffnes, 2001b, p. 169; Lock, Last & Dunea, 2001, p. 111; Sidel, 2000, p. 440; Sidel, Levy & Slutzman, 2009, p. 29). These scholarly literatures serve as a point of reference for Malaysia in that biological weapons can cause environmental contamination and for decontamination efforts to be duly emphasised.

There are also scholarly literatures that highlight provisions concerning the environment among international humanitarian law agreements (Goldblat, 1997; Mrema, Bruch & Diamond, 2009; Roberts, 2000, p. 47-86; Yuzon, 1996). These scholarly literatures provide an overview of relevant international humanitarian law as a point of departure for analysing Japan's experimenting, testing or use of biological weapons during World War II in what was then Malaya, provided of course that Japan was then a party to the relevant international agreements.

Methodology

This study is qualitative which combines a social-legal and doctrinal research approach. The socio-legal approach has been used in this study because of its multidisciplinary nature combining security studies, history and law. Since the social science methods of analysis such as a textual and content analysis have also been used, this also justifies the socio-legal approach to this study. International humanitarian law agreements provisions prohibiting biological weapons and references to the environment such as the 1899 Convention (II) with Respect to the Laws and Customs of War on Land (1899 Hague Convention), the 1907 Convention (IV) Respecting the Laws and Customs of War on Land (1907 Hague Convention IV), and the 1925 Protocol to The Hague Convention for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (1925 Geneva Protocol) have all been analysed using a textual analysis in the interpretation of their meaning in conformance with interpretivism.

Secondary resources such as books, book chapters, journals, conference papers, working papers, newspapers, magazine articles, and relevant organisational websites that provide an overview of Japan's biological weapons atrocity during World War II, and environmental contamination from the testing and usage of biological weapons were also referred to and analysed through a content analysis.

Japanese Development of Plague at the Tampoi Mental Hospital and Tuanku Muhammad School during World War II

The Japanese invasion of the then Malaya began on 8 December, 1941 in Kota Bharu, Kelantan, while Johor Bahru in Johor came under Japanese occupation on 11 January, 1942 (Boon, 2003, p. 18). Ng (1995) mentions that the Japanese imperial army once used a hospital in Tampoi, Johor as a secret laboratory for biological warfare, being part of Unit 9420 with the headquarters in Singapore. This Singapore facility was initially under the command of Hareyama Yoshio but was later taken over by Lieutenant Colonel Naito Ryoichi in 1942 till 1945 (Harris, 2003, p. 481). There were about 150 physicians and scientists at this facility who managed to produce a considerable amount of pathogens annually (Harris, 2003, p. 482). Unit 9420 dealt with typhus, plague, and pesticides (Harris, 2003, p. 482). The facility in Singapore could have tested biological weapons on prisoners, for as Harris (2003, p. 477) indicated, there were some human skeletal remains found in the 1980s, showing signs of possible small-scale human experiments

conducted. In Singapore, the Japanese also experimented on monkeys and rabbits ("*731 Xìjùn zhàn*", 2001). Japanese experimentation on these animals caused them to be infected as evidenced by a statement of Mr. Norman Covert who once worked as a chief of public affairs at Fort Detrick, United States (US). In 1991, Mr. Covert indicated that during World War II guerrilla fighters in Singapore detected contaminated rats and monkeys attributed to biological warfare (Phan, 1991b). Moreover, there were extensive research facilities found by the British at the Japanese Southern Army's No. 1 Central Pathological Laboratory in Singapore (Phan, 1991b). The diary of Major General W.E. Tyndall of the Medical Directorate of Allied Land Forces Southeast Asia indicated there were huge quantities of medical equipment left by the Japanese, as there were three hundred centrifuges on one table alone (Phan, 1991b). It is unclear though whether Unit 9420 based in Singapore could have collaborated with the biological weapons research centre in Tampoi, Johor and the animal breeding facility at the Tuanku Muhammad school in Kuala Pilah, Malaya or did it function as an independent facility in its own right. Besides Singapore, the Japanese could have maintained other biological weapons facilities in Rangoon (Yangon), Burma (Myanmar), and in Bangkok, Thailand even though there could have been other facilities in Southeast Asia that were unknown (Harris, 2003, p. 481).

While the Japanese experimented with plague at the old Tampoi mental hospital, Johor, whether any testing of plague was being carried out on animals or humans that might have caused environmental contamination and the circumstance leading to the end of the Japanese germ warfare programme remain evasive. It is also unclear whether the Japanese experimented with other biological agents as in the case of China or merely restricted their experimentation to plague at the Tampoi mental hospital.

A brief historical overview of the Tampoi mental hospital where the Japanese conducted biological warfare is provided. The Tampoi hospital first started out as a lunatic asylum in 1916 in the area of Lido beach, Johor ("Mental hospital", 1994). In 1936, the then Sultan of Johor commissioned a mental hospital in Tampoi that was opened in 1937 and known as The New Mental Hospital where eventually the Japanese studied germs and cultured bacteria for purposes of biological warfare ("Mental hospital", 1994).

The Tampoi mental hospital was exposed as a biological warfare facility through the revelations of a former Japanese technician who served the facility during World War II (Ahmad, 2009; Kouitsu, 1991). During the development of plague, the old Tampoi mental hospital had a laboratory, special ward, a building for cultivating the bacteria, an autopsy room, and a place for rearing rats (Kouitsu, 1991). The Tampoi mental hospital was also equipped then with a canteen, quarters for lower and higher ranking officers, a hall for gathering, and a place for keeping animals (Kouitsu, 1991). There was also a surrounding fence around the laboratory, special ward and place for cultivating bacteria to keep away prying eyes (Kouitsu, 1991). When the Japanese occupied the Tampoi mental hospital, their research centred on rats that were collected from nearby villages near Tampoi and as far afield as the town of Labis (Visvanathan, 1994).

Besides the Tampoi mental hospital, the Tuanku Muhammad School in Kuala Pilah, Negeri Sembilan, was also used as a breeding ground for rats and rabbits (Huang, 2005). Local Malaysians were employed to feed the rabbits with sweet potato leaves (Huang, 2005). The upper floor of the Tuanku Muhammad School was forbidden to local Malaysians but Lim Jun Tian testified that he once managed to spy on the extraction of rabbit blood stored in bottles in the upper floor of the school (Huang, 2005). Lim Jin Lou, also from Kuala Pilah provided

further testimony that the rabbit's life was more precious than humans as an infected rabbit would fastidiously be treated with serum (Huang, 2005). Yahya Yakin, the head villager of Parit Tinggi village in Negeri Sembilan provided further evidence when he was thirteen years old he was sent to breed white rats by the Japanese for about two years before transferring to the Japanese military base in Port Dickson (Isa, Derus & Unos, 1993, p. 80). These local Malaysians of course had no idea where these bottles of rabbit blood and rats were destined (Huang, 2005). At the school, there were several Japanese doctors and veterinarians as well as local Indian assistants (Huang, 2005). While the school was officially the Kempetei or Japanese secret police base, this was only a camouflage for the more sinister activity of breeding animals for the experimentation of plague as a biological weapon.

A former Japanese army officer, Takayama Yoshiaki, further provided testimony that rats were transported to Kuala Pilah from the Tachikawa airfield in Tokyo, Japan (Huang, 2005). Yoshiaki apparently accompanied some of these rats on a flight from Japan to Singapore whereupon these rats were transported to Johor Bahru and also Kuala Pilah (Huang, 2005). These white rats too were evenly distributed between Singapore and Bandung, Indonesia. The source of white rats in Japan came from Saitama Perfecture (Huang, 2005). Besides Yoshiaki, another former Japanese pilot, Shoichi Matsumoto provided further testimony that he had flown rats from Japan to Singapore and Java, Indonesia providing further credence that the Japanese were in the process of developing plague for an eventual biological weapons attack in Southeast Asia ("WWII vet testifies", 2000). When the Japanese surrendered in 1945, overnight the Japanese ordered the local Indian workers to burn all the rats and rabbits at Tuanku Muhammad School, Kuala Pilah (Huang, 2005). This was to destroy any evidence that the Japanese were indeed developing a biological weapon in the form of plague, being fully aware they were violating international agreements on the conduct of warfare which forbid biological weapons. Whether all the rats and rabbits infected with the plague serum were destroyed remains doubtful while some might have escaped.

It was clearly apparent that during World War II the Japanese were preparing for biological warfare by breeding fleas fed with the blood of over 300,000 plague-infested rats (Leow, 1995). The development of plague was in preparation for an eventual US invasion, but whether the fleas were intended to be sprayed in populated areas to spread the plague and wipe out whole villages in the then Malaya also remains another mystery (Leow, 1995). Takehana Kuoitsu, a former Japanese soldier who worked at the Tampoi mental hospital during World War II indicated that the Japanese had no opportunity to use the plague they had developed as a biological weapon ("Plan to increase", 2015). Kuoitsu was involved in the cultivation of plague fleas which the Japanese secretly called millet while rats were known as *mochi* as these were code words used by the Japanese so that their clandestine activities will not be revealed ("Plan to increase", 2015). Kuoitsu also indicated that the local Malayan people were also employed at the former Tampoi mental hospital ("Plan to increase", 2015). As for the documentation of the Japanese experimentation with plague at the Tampoi hospital and english medical textbooks, these were brought and destroyed at Thakek, Laos when World War II ended ("Plan to increase", 2015).

As a result of Japanese experimentation with plague, Japanese soldiers who were careless and did not take proper precautionary measures died of the plague (Visvanathan, 2000). Some of the bodies of those Japanese soldiers infected with plague were cremated and their ashes buried in a compound surrounding the Tampoi mental hospital (Visvanathan, 1994). The exact locations of where these bodies were buried remain unknown. Furthermore, when the Japanese took over the mental hospital, they let loose the inmates to fend for themselves, some

were shot while others wandered around until they died (Cross, 2013). British troops who were treated at this mental hospital which was then used as an army hospital were killed and buried in shallow graves (Cross, 2013). It also remains unclear whether the Japanese had ever used the mental inmates of the hospital for plague experimentation.

Indeed, the Tampoi mental hospital and the Tuanku Muhammad School's unpleasant past is now history. The Tampoi mental hospital changed its name to the Permai Hospital in 1972 ("Tampoi's fruity origin", 2010), and together with the Tuanku Muhammad school, both are still operational today.

Environmental Contamination from Testing and Usage of Biological Weapons

The Soviet Union

One famous biological weapons test site of the then Soviet Union, operational from 1936-1992, was Vozrozhdeniye Island in the western part of the Aral Sea, where in 1954 a large complex facility for testing biological weapons and defensive equipment known as Aralsk-7 was built by the Soviets (Atshabar, 2003, p. 79; Tucker & Zilinskas, 2002, p. 8). Among microbial pathogens that were tested on this island were plague, anthrax, Q-fever, small pox, tularemia, Venezuelan Equine Encephalitis (VEE), brucellosis, typhus, and botulinum toxin (Atshabar, 2003; Tucker & Zilinskas, 2002).

With the Soviet Union's dissolution in 1991, its army hastily buried anthrax on Vozrozhdeniye Island. It was not surprising at all to discover that anthrax spores survived the bleach treatment as discovered by US scientists in 1997 ("Anthrax 'time bomb'", 1999, p. 1). It was feared that these anthrax spores could be grown into a culture to form live anthrax bacteria ("Anthrax 'time bomb'", 1999, p. 1). Given that the anthrax spores were still alive and potently deadly, Uzbekistan and Kazakhstan which inherited Vozrozhdeniye Island requested US assistance in assessing and clearing up the former Soviet Unions' deadly legacy (Miller, 1999, p.2). On 22 October, 2001, the US and Uzbekistan signed an agreement as part of the Cooperative Threat Reduction (CTR) initiative with the US pledging US$6 million to destroy the remaining anthrax spores on the island and to totally dismantle the biological weapons laboratory complex that the Soviets failed to dismantle completely (James Martin Centre for Non-Proliferation Studies, 2002, p. 1).

Despite US decontamination efforts on Vozrozhdeniye Island which were purportedly successful in 2002 (Roffey, 2005, p. 11), subsequent environmental monitoring and testing will continuously need to be conducted from time to time in the foreseeable future so as to detect any further presence of anthrax or other pathogens. In 2007, a representative from the Uzbekistan prophylaxis centre indicated that anthrax spores could easily survive a hundred years and would come alive if they come into contact with any live organisms (Kozlova, 2007, p. 2). In view that the said island became connected with Uzbekistan's mainland in 2004-2005 through a natural land bridge, there is the danger that infected animals carrying pathogens on this island can be brought to mainland Uzbekistan (Kozlova, 2007, p. 2). Plague-carrying rodents, including gerbils and mice, freely roam this island while fleas from these rodents could be carriers that infect humans if these creatures ever make it to mainland Uzbekistan (Pala, 2003, p. 2). In 2007, Gappar Asenov, the head of Uzbekistan's zoological and parasitological laboratory at the Karakal-Pakstan Centre for Prophylaxis and Quarantine of Most Hazardous Infections, suggested the building of a 10-kilometre rodent-proof ring around the biological weapons test site on Vozrozhdeniye Island so that these rodents, insects, birds and other animals cannot have access to the infected site and thus prevented from subsequently passing on diseases to those on the main land (Kozlova, 2007, p. 2).

As an example of air pollution caused by the testing of a biological weapon, the accidental release of anthrax at Sverdlovsk in the former Soviet Union back in 1979 that claimed seventy lives was attributed to the failure of a maintenance personnel to replace a critical filter in a vent, resulting in anthrax being released during the production and manufacturing of a biological weapon (Wampler & Blanton, 2001, p. 6). Another form of environmental contamination from air pollution arising from the former Soviet Union's field testing of smallpox on Vozrozhdeniye Island occurred in July, 1971, when a research ship carrying a female technician charged with taking plankton samples from the Aral Sea came within 15 kilometers too close to the said island and drove into a plume of smallpox being released by the Soviets (Zelicoff, 2002, pp. 12-21). This technician survived the smallpox as she was vaccinated but caused an outbreak at Aralsk, sickening ten people while three people died (Tucker & Zilinskas, 2002, p. 7; Zelicoff, 2002, p. 13).

Gruinard Island, United Kingdom

Anthrax was also tested by the UK on Gruinard Island in the North West Scottish coast in the 1940s, resulting in this island remaining inhabitable for forty-eight years because anthrax spores contaminated the ground and could possibly survive for decades if not centuries (Zelicoff, 2002, p. 61). After a few unsuccessful attempts to decontaminate this island, apparently the effort in 1987 succeeded (McLaughlin, 2009, p. 62). Before decontamination, Gruinard Island was off limits for animal grazing as anthrax could infect animals while all other human habitation, industrial and commercial activities were totally prohibited (McLaughlin, 2009, p. 62). Gruinard Island illustrates an environmental contamination of soil, destruction to the landscape, and harm to flora and fauna (UNEP, 1995, pp. 3-4).

United States

One of the sites where the US conducted field testing for biological agents was at the Dugway Proving Ground (DPG) ("US army activity", 1977, pp. 2-3). Throughout 1951-1969, the US army conducted open-air test on humans and animals (Piller & Yamamoto, 1988, p. 45). Germ bombs containing brucellosis, psittacosis, tularaemia, plague, Q fever, anthrax, San Joaquin Valley Fever, and VEE were all tested at DPG (McDermott, 1985, p. 172). As a result, some animals around DPG were found to produce antibodies for VEE (Choffnes, 2001a, p. 172).

The open-air field testing of deliberately infecting and subsequently releasing these infected animals to infect native animal population had environmental implications. In the 1950s and 1960s, the wildlife population at DPG were found to have been infected by rabies, encephalomyelitis, Rocky Mountain spotted fever, psittacosis, Q fever, anthrax, brucellosis, plague, tularaemia, and hydatid disease (Pinkham et al., 1982, p. 173). Additionally, *rickettsia ricketsei* was also discovered among the wildlife population (Choffnes, 2001,p. 173). Besides this, birds were detected with psittacosis while the desert wood rat became the reservoir for Brucellosis (Choffnes, 2001). Plague (*Yersinia pestis*) had also been detected among carnivores and rodents within the vicinity of DPG (Pinkham et al., 1982, p. 173).

Based on these indications, it is quite clear that biological agents and biological bomb testing on animals affects the wildlife, causing environmental contamination. More worrying is that these infected animals can subsequently pass on these diseases to humans known as zoonoses.

People's Republic of China (China)

Another similar example of environmental contamination as an outcome of biological weapons testing and disarmament is that of Japan by its famous Unit 731 and Unit 1644 from 1940-1942 in spreading the epidemic of plague and cholera in the cities of Quzhou, Ningbo, Changde, Jiangshan, Yiwu, Dongyang, and Chongsan Village or Taxiazhou, as filed by a group of plaintiffs on 30 August, 2002 at the Tokyo District Court (Tokyo District Court, 2002b, p. 2).

Unfortunately for the Chinese who filed this lawsuit, the Tokyo District Court, the Tokyo High Court, and Supreme Court all rejected the claims for compensation whereby it was cited that international law prohibited foreign citizens from seeking compensation directly from the Japanese government ("Japan rejects appeal", 2005, p. 1). The Tokyo District Court had, however, finally admitted that Japan played a role in the atrocities in Zhejiang and Hunan provinces in China, stating "it is appropriate to conclude that the defendant [Japan] has sovereign responsibility for this case of germ warfare according to international customary law as established in Article 3 of the Hague Convention for War on Land" even though it denied compensation to the Chinese (Tokyo District Court, 2002a, p. 5). Another reason for rejecting the Chinese plaintiffs' claim had been attributed to a joint communiqué signed between China and Japan on 12 August 1978 called the China-Japan Treaty of Peace and Friendship whereby Japan alleged that China had agreed to waive any claims to war reparations by Japan (Tokyo District Court, 2002a, p. 5).

These towns and provinces in China now bear the brunt of environmental contamination. Qiu Mingxuan, a Chinese epidemiologist from Quzhou in Zhejiang province, reiterated the need to conduct medical examinations on rats infected with plague germs for the next fifty years from 2001 because the tests then already indicated that the rats were still carriers of bubonic plague ("The horrors", 2001, p. 3). Qiu further indicated that the plague legacy left behind by the Japanese could cause another outbreak anytime while houses, hospitals and other buildings contaminated by these germs had to be abandoned for decades ("Japan accused", 2001, p. 1). Additionally, Qiu asserted that environmental pollution and damage to the ecosystem were repercussions of Japanese wartime atrocities ("Japan accused", 2001, p. 1).

Fort Sherman, Panama

At Fort Sherman, Panama, the US tested biological weapons. In this location, the US National Institutes of Health's Middle America Research Unit (MARU) experimented with VEE that can decapitate humans but does not kill, making it a good candidate for a biological weapon (Choffnes, 2001a, p. 6; Poland, 2003, p. 70). Likewise, the Gorgas Memorial Laboratory conducted experiments among humans at Almirante from 1960-1962, and at Darien and the urban communities of Patoistown and Zegla in 1968 (Poland, 2003, p. 71). In 1981, an outbreak of VEE occurred among military personnel that underwent training at the Jungle Warfare Training Centre in Fort Sherman, Panama, leading to the view that VEE had lingered from the testing of the 1960s till 1970 (Poland, 2003, p. 71). As a result of previous experiments with VEE at Fort Sherman, VEE still remains an endemic threat in selected areas of Central America (Choffnes, 2001a, p. 6).

Besides VEE, the US also tested another biological agent called *Bacillus globiggi* bacteria (BG) related to anthrax through a test called Big Jack, Phase A, near Fort Sherman Military Reservation at the Panama Canal Zone in February-March, 1963 (Kelley, 2002, p.1). At that time also, it was thought that BG was harmless; later it was determined that BG could cause life-threatening infections among people with a weakened immune system (Kelley, 2002, p.1). Thus, BG does have a deleterious effect on human health.

International Law Prohibiting Biological Weapons and Addressing Contamination to the Environment

Mid-19th Century – 1900

The codification concerning the prohibition of biological weapons can trace its history back to the Lieber Code that was signed by President Abraham Lincoln on 24 April, 1863 during the American Civil War ("The war of the rebellion", 1899). Article 16 of the Lieber Code states that "it does not admit to the use of poison in any way", showing that biological weapons usage was regarded as a poison ("The war of the rebellion", 1899). Furthermore, Article 70 of the Lieber Code mentions that "[t]he use of poison in any manner, be it to poison wells, or food, or arms is wholly excluded from modern warfare. He that uses it put himself beyond the pale of the law and the usage of war" ("The war of the rebellion", 1899). The Lieber Code sets the tone concerning conduct in times of martial law, civilian protection and their property, treatment of Prisoners of War (POW), deserters, pillaging, prisoner exchange, and other aspects of warfare. This was then followed by the 1874 Brussels International Declaration concerning the Laws and Customs of War whereby Article 13 (a) forbids the employment of poison or poisoned weapons (Brussels Committee, 1874).

Further developments prohibiting the use of biological weapons resulted in the Hague Convention of 1899. There are three main treaties and three declarations to the Hague Convention of 1899. Of relevance is Convention (II) with Respect to the Laws and Customs of War on Land (1899) whereby Article 23 (a) prohibits the use of poison or poisoned arms (1899 Hague Convention, 1899). Also of relevance is Article 23 (e) of the 1899 Hague Convention (II) that prohibits the employment of "arms, projectiles, or material of a nature to cause superfluous injury" (1899 Hague Convention, 1899). Poison as understood then was meant to cover toxic chemicals and biological agents for diseases.

The Period 1900 – 1945

A second peace conference was subsequently convened in The Hague, Netherlands in 1907 that resulted in thirteen treaties and one declaration. Of the relevant treaties, Article 23 (a) of the 1907 Hague Convention IV (1907) forbids the employment of poison or poisoned weapons, while Article 23 (e) forbids the employment of arms, projectiles, or material that were calculated to cause unnecessary suffering. Article 23 (1) (g) of the Regulation annexed to the 1907 Hague Convention IV (1907) asserts that it is forbidden "to destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war". Property in this regard may refer to natural resources, protected areas, and environmental goods that concern the environment. The 1925 Geneva Protocol (1925) also banned the use of asphyxiating, poisonous or other gases, and extended the prohibition to the use of bacteriological methods of warfare. Notably, the 1925 Geneva Protocol did not ban the development, production and stockpiling of biological weapons.

Throughout the 1930s, efforts were made within the ambit of the League of Nations to ban biological weapons without much success (Goldblat, 1997, p. 1). After World War II (1941-1945), the military tribunal for the trial of key German war criminals during the Nuremberg Trials (Judgment of the International Military Tribunal, 1946; International Military Tribunal, 1946) found by 1939 that the rules concerning methods and conduct of warfare from the 1907 Hague Convention were recognised by all civilized nations as declaratory of the laws and customs of war. This meant that countries did not have to ratify the 1907 Hague Convention to be bound by its provisions concerning the methods and conduct of warfare, as most of these have been regarded as customary international law. This had also been affirmed by the UK in

its 1958 military manual "The Law of War on Land", being Part III of the Manual Military Law (UK Military Manual 1958) (The War Office, 1958, p. 41) which stated that "[t]he use of bacteriological methods of warfare is forbidden". A subsequent footnote to this UK Military Manual 1958 further explained that "the prohibition […] in the [1925 Geneva] Gas Protocol was declaratory of the view generally accepted by the civilized world" (The War Office, 1958, p. 41). The UK Military Manual 1958 in Section 111, footnote 1(b), further adds:

> *As Japan was not a party to the [1925 Geneva Protocol], the Russian military tribunal at Khabarovsk […] would therefore seem to have assumed that the prohibition of bacteriological warfare derived from the customary law of war prevailing among civilized nations and it was declaratory of such customary law* (The War Office, 1958).

Even prior to the Hague Conventions of 1899 and 1907, the prohibition of using poison that includes pathogens goes back to ancient times such as those covering the Manu laws of India (prior to 500 BCE) and ancient laws of the Chinese, Greeks and Romans as well as the Koran (Mathews, 2015, p. 2). While there seem to be customary international law prohibiting the use of biological weapons, only Article 23 (1) (g) of the Regulation annexed to the 1907 Hague Convention IV (1907) addressing property would seem to encompass natural resources and environmental goods relating to the environment.

Results and Discussion

Environmental Contamination

Although there are no longer any biological warfare activities at the old Tampoi mental hospital or the Tuanku Muhammad School in Kuala Pilah, there are important issues to be considered. Environmental contamination needs to be considered especially if there are traces of plague bacteria among the skeletons of Japanese soldiers who were buried wholly and not cremated into ashes which can cause ground contamination. Based on Vozrozhdeniye and Gruinard Island past biological warfare activities, anthrax continued to be present even after a considerable number of years. In 2011, scientists from Canada and Germany retrieved *Yersinia pestis* (plague) samples from the teeth and bones of the mid-1300s plague victims of the Black Death in London for gene sequencing (Minard, 2011). Even after 600 years, the plague sample still survived and these scientists were able to perform gene sequencing. Therefore, it begs the question whether plague samples found among the Japanese soldiers' skeletons can still pose serious health or environmental implications. To do this, Malaysian researchers will have to collaborate with relevant scholars from abroad, obtain past documents from archives and research institutions overseas detailing where the Japanese dead soldiers were buried before any samples of plague (if in existence) can be tested. Moreover, another form of environmental contamination to be considered are rats as carriers of plague among the animal population. The fate of rats which the Japanese experimented with at the old Tampoi mental hospital and Tuanku Muhammad School in Kuala Pilah so long ago is unknown. Whether some of these rats could have escaped to spread the plague to other rats or were totally killed and burnt, also remains unknown. Tests will need to be carried out among the rat population near the Tampoi mental hospital and Tuanku Muhammad School in Kuala Pilah to ascertain whether these rats are carriers of the particular strain of plague that the Japanese experimented with. After all, there was evidence of plague among rats and carnivores collected around DPG in the US in 1972, where biological weapons were tested (Pinkham et al., 1982). Just like the case of Vozrozhdeniye Island where it was feared that rats, being carriers of the plague, could harm mainland Uzbekistan and Kazakhstan (Pala, 2003) and the case of Quzhou in Zhejiang, China ("The horrors", 2014), it is also feasible to test the rat population within the vicinity of the Tampoi mental hospital in Johor and Tuanku Muhammad School in Kuala Pilah, Negeri

Sembilan to ascertain whether remnants of the plague remain as a legacy of Japanese biological warfare during World War II. Taking the cue from Singapore which had infected rats and monkeys from Japanese experimentation with plague (Phan, 1991b), it is time for the Malaysian authorities to test the rats and rabbits (if any) within the said vicinities. This is crucial towards determining whether contagious strains of the plague still remain as well as remedial actions to be taken in order to prevent health problems from infected rats and any environmental decontamination. And if needed be, soil samples should also be tested for contamination. If traces of plague bacteria are ever found, the Malaysian authorities must also be careful not to publicise this in the open as it is feared this could also attract terrorists with evil intentions to obtain the plague for bioterrorism raising a biosecurity concern. Indeed, it is possible for terrorists to try to turn the plague into a biological weapon although this is not easily achieved as it takes a lot of scientific expertise and tacit knowledge. This is because terrorists lack professional expertise in mastering the art of turning plague into an effective biological weapon with a suitable means of delivery.

Therefore, it is up to the Malaysian authorities to acquire the relevant historical documents and to gather more information that will enable remedial actions to be taken for the sake of ensuring that the health and environmental surroundings of Tampoi and Kuala Pilah's population are devoid of any biological agent threat.

Applicable International Agreements and Customary International Law

In examining any Japanese violation of international humanitarian law, the 1899 and 1907 Hague Conventions that Japan had signed and ratified prior to World War II would have applied to Japan regarding its plague experimentation at Tampoi, Johor (International Committee of the Red Cross (ICRC), 1995). Hardly any information exists today to indicate beyond any shadow of doubt whether the Japanese had actually tested plague as a biological weapon on the victims and inmates in the Tampoi mental hospital. Of course, Japan could not be faulted for the development, production, and stockpiling of plague as a biological weapon because the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxins Weapons and on their Destruction (in short Biological Weapons Convention (BWC, 1972) only came into being much later in 1972.

Neither would Japan have violated the 1925 Geneva Protocol (1925) banning the use of biological weapons because Japan did not ratify this international agreement until 1970 (ICRC, 1995). Customary international law prohibiting biological weapons for biological warfare can implicate Japan because the intention of developing plague at the Tampoi mental hospital was intended to be used against the US and its allies if they ever retook Malaya again as Japan's means of defence. In a 2002 court case filed by Chinese nationals in Japan, the Tokyo District Court admitted that Japan had a role in the biological weapons atrocities in the Zhejiang and Hunan provinces in China, for it stated: "it is appropriate to conclude that the defendant [Japan] has sovereign responsibility for this case of germ warfare according to international customary law as established in Article 3 of the Hague Convention for War on Land [the 1907 Hague Convention IV]" – but denied compensation to the Chinese (Tokyo District Court, 2002a, p. 5). Then again, much more remains to be done in gathering the relevant information from relevant archives and research institutions abroad to determine whether the Japanese ever tested and used biological weapons in Malaya at the time. As for any environmental contamination caused to the old Tampoi mental hospital and Tuanku Muhammad School, Article 23 (1) (g) of the Regulation annexed to the 1907 Hague Convention IV (1907) would have applied to Japan because it had seized the said buildings and their surrounding land then under British ownership while contamination from plague germs destroys the cleanliness of the building.

This being the case, any Japanese experimentation with plague at the Tampoi mental hospital in Johor, and in Kuala Pilah, Negeri Sembilan is not merely about trying to address an unpleasant part of Malaysia's past. As indicated in the discussion section, much remains to be further investigated in order to determine whether there are long-term repercussions health-wise and environmentally from Japanese experimentation with plague during World War II. Just as important is to determine whether it may still have an impact even today.

Conclusion

In conclusion, a lot more efforts remain to be done in gathering more information and evidence of Japan's wartime biological weapons facilities at the old Tampoi mental hospital in Johor and Tuanku Muhammad School in Kuala Pilah, Negeri Sembilan. This is not just a matter of better understanding Malaysia's past history as there could also be long-term environmental repercussions detrimental to the attainment of sustainable development. In this regard, this study can be further extended by collaborating with scholars from abroad, referring to archives and research institutions overseas that keep documented evidence regarding the Japanese Unit 9420's activities in Malaya in order to obtain a more accurate picture of whether the Japanese merely experimented with or used plague. This is crucial to determining whether there are long-term environmental implications from such experimentation and of course any decontamination efforts or other remedial actions that Malaysian authorities ought to take in time to come when more evidence surfaces. For now, the direction of future research remains focused on gathering the relevant historical documents from abroad and making contacts with foreign researchers having expertise on Japanese biological warfare activities in Southeast Asia which may shed light on the biological weapons facilities mentioned.

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