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# BIOLOGICAL WARFARE

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A REPORT

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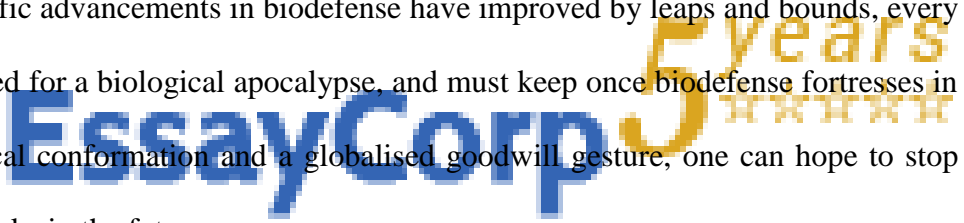
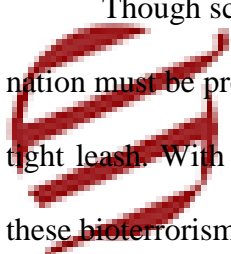
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## ABSTRACT

Biological Warfare is the use of biological agents for the purpose of war. The damage caused by the biological weapons is irreversible, widespread and uncontrollable. In between the two world wars, the Geneva declaration was passed banning the use of bio-weapons. But as a result of many superpower nations not conforming to the declaration, widespread damage continued through the Second World War and after. Thus, in 1972, The Biological Weapons Convention outlawed the overproduction, storage and offensive attack of biological warfare. Australia heads the Australia Group in the BWC, which facilitates biodefense programs such as identification, management and prevention of biological weapons.

Though scientific advancements in biodefense have improved by leaps and bounds, every nation must be prepared for a biological apocalypse, and must keep once biodefense fortresses in tight leash. With ethical conformation and a globalised goodwill gesture, one can hope to stop these bioterrorism attacks in the future.



## INTRODUCTION

Since the evolution of life on earth, the need for survival has induced man to be constantly in the attack mode, to view any uncomfortable situation as a potential threat. Slowly, movement of man from a primitive savage to a civilized person who can think, replaced the need for survival with the “greed” for survival, wherein intentional destruction was carried on uncomfortable situations even when they did not pose any threat. Man, at the top of the ecological pyramid, has used, misused and abused Nature to such an extent, that it has come to the stage where he uses Nature to destroy his own race. Man confronts Man in war, and the stronger one wins. This has been continuing for ages, with much such documentation in history

Biological Warfare or bio-war is the use of infectious and toxic biological agents such as bacteria, viruses, and fungi with the intention of killing, or destroying a particular generation of life. (Sidel, 1997) The agents which are used in bio-wars are the biological weapons, which are the living replicas of the deadly toxins or infectious organisms, which have the potential to rapidly spread and cause widespread damage. Bio-weapons cannot be controlled once released, and the damage is unfathomable. To avoid mass destruction of humanity, the Biological Weapons Convention has outlawed the overproduction, stocking and the use of bio-weapons. However, research and biological defense is permitted by the BWC, which is being actively pursued by many countries, including Australia. (United Nations Office of Disarmament Affairs)

In this report on biological warfare, we shall discuss the genesis, use, misuse, and the damage caused by biological warfare worldwide in the past, the plan on action on bio-wars in Australia today, and future insights. An ethical perspective to biological warfare shall also be dealt with.

## BIOLOGICAL WARFARE IN THE YESTERYEARS

Man has abused Nature ever since his greed for survival had surfaced, leading to notorious activities since time immemorial. History documented in mythology; be it the Trojan War of Greece or the Kurukshetra War of India, has a lot to say about the use of biological agents in the destruction of the enemy. The common ways of bio-wars those days were poisoning water sources with venom from animals and plants, infecting the enemies with diseases from cadavers, clothing, and other elements.

In 1789, an attempt to exterminate the aborigines of Australia was allegedly made by the British, by causing a deliberate infection of smallpox resulting in an epidemic. There are many theories which both support and negate this accusation. Though the British have refuted the accusations, majority of evidence support the incidence of the smallpox virus having been used as a biological weapon (Warren, 2014 ); which drastically impeded the immunity and survival of the aborigines.

With the advent of microbiology and biotechnology, sophistication in biological warfare came up to the fore. When one group of scientists were identifying the disease causing agent and discovering new drugs, vaccines and cures for diseases, a few other politically influenced group was busy creating weapons of destruction by the same disease causing agents, by manipulating their mechanism of action, and stock-piling the weapons created. The paradigm shift to “germ wars” started at the end of the 19<sup>th</sup> Century, when the same elements to cure Man were used to threaten mankind (V. Barras, 2014).

In both World War I and II, and in the period after, many attempts to use Biological warfare were made by superpowers, on different nations. The mass genocidal effects of the bio-

weapons alongside with the nuclear and chemical weapons became a political issue of international concern. In 1925, the Geneva Protocol prohibited the use of bio-weapons, but the loopholes in the protocol made it feasible for many countries to carry on attacks in the name of testing, research and accidents. This led to the weaponisation of many deadly disease causing agents such as plague, tularemia, anthrax, mycotoxin, etc. Foreseeing mass genocide and destruction of humanity, the United Nations signed the Biological and Toxin Weapons Convention (BTWC) in 1972. This imposed a total ban on the “development, production and stockpiling of microbes or their poisonous products except in amounts necessary for protective and peaceful research” (United Nations Office of Disarmament Affairs) This led to trashing of thousands of research findings, and the mass destruction of the stockpiled bio-weapons. As of 2011, 115 countries have officially joined the BWC and pledged to do away with biological weapons.



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Following the terrorist attacks on the twin towers in the United States of America, inexpensive envelopes filled with a white talcum powder like substance created widespread terror through the country, and alerts were sent worldwide. It was then found out to be the anthrax, which was sent to cause destruction. Even as we are supposedly prepared to face the future, a tinge of anxiety does loom over our heads, of any other outbreak, for which we might not be ready to face.

## BIOLOGICAL WARFARE AND BIODEFENSE

Biological Warfare, though primarily created to destroy, has two main modes of operation – Offensive and Defensive.

The BTWC has banned the use of offensive biological warfare. It was the rationale that the bio-weapons do not discriminate between a friend and a foe, and it would cause massive uncontrolled destruction by incapacitating the victim, also the user. Types of offensive biological warfare are anti-personnel warfare, where the army and civilians of the country are attacked with virulent and infectious germs, so that the people die of disease and disability; anti-agricultural warfare, where the user destroys the vegetations, crops, livestock, and fisheries of the enemy nation, thus forcing three to four generations of people die of starvation; entomological warfare, where insects infected with diseases are used to attack the enemy personnel, crops, thus causing an epidemic outbreak. Genetic warfare is another type of offensive bio-war, if abused could lead to inefficiency of vaccines, disease resistance to the antibodies, would alter the course of gene mapping, thus resulting in a weaker next generation. (Ainscough, 2002)

Defensive Biological Warfare or biodefense is the response to the biohazards of bio-wars. It involves identification, prevention, and management of the ill effects of biological warfare. Protection of food stock and supply, water sources, and agriculture is the first step towards biodefense. Creating awareness among farmers, fisher folk, dairy farmers etc. on the damage caused by biowars, and enabling early reporting of any suspicious change in the crops/fisheries/water can prevent large destructions. Identification of early signs and symptoms of biological attack might go a long way in the prevention of a mass genocide. A surveillance system enabling physicians and veterinarians who constantly keep check on any new disease

outbreak is a part of biodefense. This depends on close co-ordination between the public and the government which, however, needs much improvement. The first automated bioterrorism detection system – the Real-time Outbreak Disease Surveillance (RODS) was developed in 1999. (H. J. Jansen, 2014) It could gather data, analyse and detect any bioterrorism activity at the earliest. This helped detect and avert the onset of many biowars since then.

Management of biowars is also a part of biodefense. Adequate treatment to any diseases, destruction of infected crops and fisheries, alternative measures of import/cultivation of fresh healthy crops, early replenishment of the destroyed resources, and rehabilitation of the affected individuals/community are the essential measures to be taken, so as to bring a biowar affected region back on its feet, to face the future.





## AUSTRALIA AND BIOLOGICAL WARFARE

Australia is a peace loving country, and has no weapons of mass destruction (WMD), which include nuclear, chemical and biological weapons in its possession, and is in no intention to do so in the future. Australia is a member of the BTWC since its conception in 1972, and heads the “Australia Group” in the BTWC. The main objective of the Australia Group, which was formed as a measure to limit the world nations take undue advantage of the Geneva Protocol, is to “use licensing measures to ensure that the exports of certain chemicals, biological agents, and dual-use chemical and biological manufacturing facilities and equipment, do not contribute to the spread of Chemical and Biological Weapons (CBW).” Australia is also a member of the “Proliferation Security Initiative”, (Department of Foreign Affairs and Trade, Australian Government, 2016) which prevents illegal trafficking of the WMD’s. As a part of the PSI activities, Australia has hosted three joint training activities in Europe, Asia, and North America has been conducted on collaborative biodefense.

Reports show inclination towards biowars in the past, before Australia signed the BTWC. (Nicholson, 2002) This was revealed by the Declassification of files from the National Archives of the Australian Department of Defense. The papers revealed the advice of a Nobel Prize winning microbiologist Sir Frank Macfarlane Burnet to the Department of Defense, encouraging the development of biological weapons to destroy South Asia, taking to advantage the malnutrition and lowered immunity of the people. The plan was averted as interests in weaponry turned from biological to nuclear. In 1938, bio-weapons were used to control the rabbit population. This extreme step was taken following the failure of conventional methods, as the ecological damage to Australia caused by wild rabbits was far more devastating. The myxomatosis virus, (V. Barras, 2014) which fatally reduces the immunity of the rabbit, was field

tested, resulting in a drastic reduction of rabbit population. The remaining rabbits that survived developed immunity to the virus, and in 1996, a new weapon “rabbit calcivirus” had to be introduced to control rabbit overpopulation.

Though Australia strongly abhors biological warfare, biological research is being carried out by its scientists. Stockpiling of vaccines for a potential smallpox/anthrax attacks were done as a precautionary measure, in 2004. A "Physical Containment Level 3" complex, established in 2014, is the highest-security disease research facility in the state of South Australia. The exact location of the facility is withheld, owing to security reasons. This facility deals with genetically modified micro-organisms, laboratory procedure involving small and non-adult forms of terrestrial animals. This initiative is taken to initiate early identification and screening of any suspected bioterrorist attack, and to promote biodefense.



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## BIOLOGICAL WARFARE AND BIOETHICS

How ethical is War? Or rather, is war even the right thing to do?

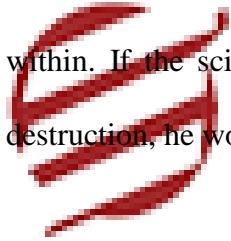
What happens in war? Thousands of young men, the most courageous and the most physically fit in every nation, are killed, bringing great sorrow to their family, and loss of valuable human resource to the community. Many others are maimed for life, physically, mentally, socially. Of the handful of survivors many will be morally degraded by the killing, which destroys the human in the soldier. As every truthful record of war shows, fear, insecurity and hate had lead to the unwanted massacre. Ironically, the burden of war is borne by the shoulders of the poor common man, who most of the time has no idea of what is going on. Coming to Biological warfare, an entire race is left without food and water, the land becomes uncultivable, their immune system is laid open to infections, and the treasury is drained in treating the newfound disease. Even their right to pass on their genes to their offspring is snatched away, as there are synthetic bio-weapons to alter the genetic pathway. All living creatures are bereft of life, and if alive, are doomed to live a life without any life in it. (Margaret A. Somerville, 2005)

What ethics can be there in this destruction? In biological warfare, the scientific knowledge of construction is sold by highly intelligent but devious scientists to opportunists for a few pennies, manipulated, and left uncontrolled enough to cause widespread destruction. Here, there is a violation of the Hippocratic Oath, whose essence states that the physician may do no harm using his knowledge. Any scientist following the code of ethics for life sciences will know to do better than use his scientific knowledge for the purpose of mass destruction. One of the clauses of the Geneva Declaration (Clegg HA, 1968) states that

“I will maintain the utmost respect for human life from the time of conception; even under threat, I will not use my medical knowledge contrary to the laws of humanity.”

Still, if there are many a scientist who has sold his knowledge for mass destruction of humanity, it could only mean that the greed for money and lust for power has blinded his vision, and redirected his brain from working towards construction, to becoming a literal personification of the Grim Reaper. One man’s gain becomes humanity’s loss, thus affecting the creator of destruction himself.

Are stricter ethical codes and morals the solution? Must the consequences of breach be made more severe? Do they even get a consideration? The answer is straight – Change comes from within. If the scientist involving in such activities gets to experience the after effects of the destruction, he would know better than to destroy.



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## FUTURE PROSPECTS OF BIOLOGICAL WARFARE

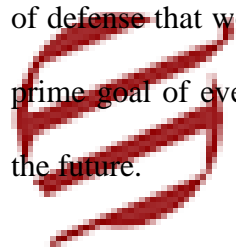
The future is the unknown realm; things can go good, bad or ugly. As most countries are in pact with the BTWC, an offensive biological warfare might not be the first thing to be concerned about. Yet, the status of the countries that have not signed the pact and their latent potential to cause widespread damage using biowarfare is something to be wary about. Strengthening the biological defense to counter any attack by rendering it a failure, must be done and monitored regularly.

One major risk that looms ahead is the rise of synthetic biology or genetic engineering; misuse of certain vital information can cause unfathomable damages. Given sufficient time, experimentation and selection, it is possible that the findings of synthetic biology research can find its way into biological warfare. The Defense Advanced Research Projects Agency (DARPA) is researching on BioDesign, a “synthetic organism that can live forever, produce the intended biological effect or if need be, killed off with the flick of a molecular switch.” Arturo Casadevall, an American scientist, predicted three major threats to the human existence - A large-scale thermonuclear war followed by a nuclear winter, an asteroid impact killing the planet and spread of infectious disease. Of the three, the last one is seen as the effect biological warfare, through the evidences seen in the present.

To quote Michael Crow, the President of Arizona State University,

*“The biologically-based conflicts of the future would be wild by comparison: I’ll wipe out your food supply, I’ll wipe out your water, I’ll wipe out your ability to reproduce, I’ll wipe out your ability for your gene line to advance.”*

It is important to be prepared for the known and unknown threats to which the available scientific research establishment that can respond rapidly, in order to defend humanity. (Casadevall, 2012) On the other hand, biodefense scientific research has improved in leaps and bounds, over the decades. Detection of biological weapons has been made feasible by using spectroscopic analysis, electrochemical, piezoelectric, and optical biosensors; an example being the ultra violet-laser induced fluorescence LIDAR. Many state level biodefense facilities are being developed, and the area is kept under constant surveillance. New drugs and vaccines of increased antibody strength are being researched upon for the prevention and management of any diseases caused by biological weapons. Diseases that have been long eradicated are being studied again to develop potent management measures in case of its outburst. Establishing a strong line of defense that would make any potential attacker rethink about launching a biowar must be the prime goal of every nation, so that the incidence of biological warfare would remain closed to the future.



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## CONCLUSION

Biological warfare will not end by making sweet promises for a peaceful future. There might be several reversals that might happen, with countries illegally stockpiling on bio-weapons in the name of research; or countries defecting from the convention; or superpower nations allegedly assisting the nations that have not signed the BMC. One must be prepared to face the future, grim as it might appear. One must always remember that in war, the ego clashes of the leaders cost the common man of his life and ability to live.

The world today is already facing a lot of issues such as Nature's fury, terrorism, man-made disasters such as pollution, oil spills, etc. Bioterrorism is something we can definitely do without. Peace conferences should not be under covers for terrorism discussions, neither must be scientific knowledge put in to wrong use, so as to destroy the universe. The need of the world today is Peace, Health and Joy; let not anything else come in the way of human life.

At this point when the future is unknown, one must work hard to prepare for the worst, and then sit back and hope for the best.

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## APPENDIX

Some Notable cases of Biological warfare from the past till the present. (V. Barras, 2014)

Year	Event
14 <sup>th</sup> Century BC	The Hittites sent Rams infected with Tularemia to their enemy camps
6 <sup>th</sup> Century BC	The toxic plant <i>hellebore</i> was used to poison water supply of besieged towns
4 <sup>th</sup> Century BC	Archers used arrows tipped with human blood, animal venom and feces to infect enemies
184 BC	Pots filled with snake venom were thrown on enemy ships
1115 AD	Barbarossa poisons water wells with human bodies
1346	Mongols hurl bodies of plague victims over the walls of the besieged city of Caffa
1495	Spanish mix wine with blood of leprosy patients to sell to their French foes, Naples (Italy)
1763	British distribute blankets from smallpox patients to native Americans
1797	Napoleon floods fields around Mantua to enhance malaria.
1915 - 1918	Germans infect animals of Allies with anthrax
1932 – 1945	Japanese conduct large - scale human experiments and biological warfare in China, using entomological warfare
2001	Anthrax outburst in the US following terrorist attacks