PLAGUES, PARANOIA, AND COLD WAR BLOWBACK: THE CONTINUING NATIONAL SECURITY RISK OF THE SOVIET-UNITED STATES BIOLOGICAL ARMS RACE

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ABSTRACT

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The Cold War biological arms race is a site of contention within the geopolitical landscape under the theories of containment and mutually assured destruction. Rapid proliferation of biological weapons creates instability within the construction of biosecurity and is further complicated by the status of the Russian Federation and its stiffening of international relations with the United States. The thesis will analyze the impact of the Cold War biological arms race within national security policy, particularly in terms of terrorism and Russian movement into a new Cold War mentality, marked by the increasing lack of transparency. The analysis will highlight inefficiencies of the Biological and Toxin Weapons Convention between the United States and the Russian Federation to delineate the reasons needed for a foreign relations focus on bioterrorism by non-state actors and the influence of the Soviet Union on the current crisis of the global eradication of biological weapons.

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CHAPTER I

INTRODUCTION

My purpose in this study is an examination of the importance of the historical biological arms race during the twentieth century as the precursor and overarching influence of two major current national security concerns, the rise of bioterrorism utilized by non-state actors, such as Islamic terrorist groups, and the attitude of the Russian Federation towards transparency into the status of its biological weapons program. An understanding of the Cold War arms race is tantamount to international relations between the United States and the Russian Federation due to crucial current events, namely terrorism and Russian territorial and diplomatic pursuits. The current political landscape is fraught with tenuous international ties and, in particular, the presence of Vladimir Putin as leader of the Russian Federation is problematic due to the inability to gauge his overall diplomatic and nationalistic aims in a global context. The history of the biological arms race highlights a massive proliferation of unstable offensive and defensive weapons that, at least on the Russian end of this conflict, have become unsecured and continuing interest and research by both the Russian Federation and countries in the Middle East serves as a question of global security.

In the twentieth century, technological advances with weapons and weapons dispersal systems created an atmosphere of paranoia and the caused creation of governmental programs and agencies charged with the innovation of new ways to confront an increasingly contentious global landscape. The introduction of nuclear, chemical, and biological weapons into Cold War society is the flashpoint to the arms race that dominated the twentieth century and continues to influence the current geopolitical landscape. The Cold War itself can be characterized as a period of global history in which two superpowers entered into a political relationship marked by tactics that were "a form of global insurance against catastrophe, a system of political control which prevented local wars from getting out of hand" and the superpowers in question, the United States and the Soviet Union "did not permit, because they dared not risk, a regional conflict developing into total war."[1] Furthermore, the Cold War exists within a paradigm "of two broad kinds: wars of ideology, about what other men and women are allowed to believe: and wars of succession and the balance of power" and the Cold War can be characterized as a combination of both types of war because:

> it was about the balance of power, a war of the German succession, and at the same time it was an ideological confrontation. The Cold war was fought about the fate of Europe, and by the two great successor states of the European tradition, the United States and the old Russian autocracy reborn as the Soviet Union through the ideology of Communism. It was thus the last and greatest of Europe's civil wars.[2]

The problem of competing visions of postwar Europe predominates the geopolitical landscape of the twentieth century and early attitudes towards the Soviet Union espoused

by United States political officials, including George Kennan, in the decade after World War II was "to 'divide Europe frankly into spheres of influence, keep ourselves out of the Russian sphere and keep the Russians out of ours.'"[3] The relationship is reflected in all areas of the United States, Europe, and Asia and the theories of containment, zero sum game, and mutually assured destruction are official governmental theories of the international relations situation for much of the twentieth century and a way of explaining of the intents, purposes, and effects of the arms race for both the United States and the Soviet Union. The issue of containing the influence of the Soviet Union not only dealt with the creation of Kennan's spheres of influence that would constrain the geographical expansion policy of Soviet leaders, such as Josef Stalin, Nikita Khrushchev, and other top military and political leaders of the Politburo, but also constraining the scientific-military complex that created the biological weapons program that threatened the continued aims of the Cold War.

Early in the Cold War, the theory of mutually-assured destruction is used to promote the balancing act of both sides of the conflict. While this theory is mainly applied to the issue of the nuclear arms race, its application to the biological weapons programs of the United States, and more importantly the Soviet Union, is crucial in understanding that these weapons are:

> 'absolute weapon[s],' and any war waged with such weapons the greatest catastrophes, to be avoided at almost any cost. Deterrence was to be accomplished by convincing potential aggressors (assuming their decision-making rationality) that the gains to be achieved by deliberately resorting to [biological] war on a sizeable scale could never outweigh the costs of embarking on such as course.[4]

The biological weapons programs of the Soviet Union and the United States represented another layer of threat during the Cold War that not only explicated the dire situation of mutually-assured destruction, but also the unacceptable result of the Cold War going "hot" into active armed combat that would result in a zero-sum game where any achievements or goals would be superseded by the total destruction of the global landscape.

While the nuclear programs of the United States and the Soviet Union are arguably one of the most well known activities during the Cold War, the proliferation of biological weapons research and production becomes paramount to the examination of the current problems within the global political landscape, particularly in terms of the security threat of terrorism and the possibility of the new Cold War phenomenon, a stiffening of international relations between the United States and the Russian Federation. Currently released documents highlight that the Soviet biological warfare program began in the 1920s and 1930s and grew to the largest and earliest such program in the world. The Soviet biological research activities were originally based within the Leningrad Military Academy and conducted research during World War II, a crucial event that created the necessity for new avenues of offensive and defensive weaponry. During World War II, allegations that Soviet troops deployed weaponized tularemia against German troops in the Battle of Stalingrad surfaced, which would have violated the 1925 Geneva Convention. In reaction to substantiated evidence of the Soviet Union's biological weapons program, including Soviet interest in the Japanese Unit 731,

American officials called for an escalation of the nation's secret bioweapons program, reinforcing the belief of the scientific community that their experiments were crucial to the containment of the Cold War, if only to protect the United States from Soviet retaliation, thus creating large bioweapons laboratories, especially at the Pine Bluff Arsenal. The United States was similarly already engaged in research into biological weapons and the army already utilized the army installation to manufacture weapons also using pathogens, such as tularemia.

The scope of this study will examine the Cold War biological arms race between the United States and the Soviet Union and its application to current national security concerns with the advent of global terrorism and the new Cold War. For all intents and purposes, 1956 is delineated as the concrete starting period of the biological arms race due to American intelligence and Soviet rhetoric confirming the Soviet bioweapons research program. Although the arms race begins in 1956, it is useful to examine earlier instances of bioweapons research and utilization of such weapons, particularly by the Soviet Union, in order to trace the history of the Soviet Union's noncompliance with several international treaties, such as the Geneva Convention and the Biological and Toxin Weapons Convention. The historical impact of the Soviet bioweapons research industry begins with the creation of the anti-plague system during the tsarist period prior to creation of the Soviet Union. The structure and role of this system became subsumed into the biological weapons program by the 1960s and 1970s. Conversely, the United States is conducting its own research into retaliatory weapons during World War, but the

scope and duration of the bioweapons program is brief, with the major industrial and research installations being decommissioned after the war and the American bioweapons program being dismantled by the executive order of President Richard Nixon in 1969.

The diplomatic relationship of the United States and the Soviet Union during the Cold War period, marked by the fervent arms race of biological weapons, serves as a continuing security threat with the Soviet violation of the 1972 agreement at the Biological and Toxin Weapons Convention. Questions regarding the veracity of the Soviet Union in denouncing the existence of a biological weapons program punctuates the period, specifically with the 1971 Sverdlovsk incident, in which a geographical cluster of anthrax cases point to the continued manufacturing of weaponized pathogens. Various United States investigative and intelligence bodies are invested in discovering the truth surrounding this incident and it is not until the defection of a high-ranking Soviet bioweapons program official, Ken Alibek, that the United States government receives an accurate depiction of the cause of the accident, as well as the full scope of the Soviet biological weapons program.

Further complicating matters is the actions of both the United States and Russia in both 1991 and 2001 in their refusal to tighten control and revise the Biological Weapons Convention to include bioterrorism and releasing data pertaining to biological weapons inventory and facilities. Questions surround whether the Russian Federation is dismantling its bioweapons program and whether continued research into offensive and defensive weapons is being conducted due to the lack of transparency with the nation's

officials, particularly during the era of Vladimir Putin as president and prime minister. A reluctance on both sides of the conflict over biological weapons highlights a gap in national security aims for both countries that can serve as the path for a possible biological terrorism event due to the collapse of the Soviet Union destabilizing the security of the military installations across the Soviet bloc that housed biological weapons and materials.

The legacy of the Cold War arms race serves as a catalyst for the continuing security concerns for the global community and the introduction of non-state actors, such as transnational terrorist groups, heightens the need for the security of both biological weapons and the manufacturing plants of these weapons. One of the pressing needs in the current political landscape is the threat of terror cells obtaining the technology and means to utilize Weapons of Mass Destruction (WMDs) and moreover the presence of unsecured caches of these weapons or weaponized diseases serves as a dire threat for the security of the United States. The evidence of Russia's continued interest in bioweapons research and the nation's relationships with states hostile to the United States, such as Syria and Iran, and the recent acquisition of Crimea and threat to Eastern Ukraine, will be examined to highlight other current issues that threaten the United States' national security and how United States-Russian relations is entering into a new Cold War period.

CHAPTER II

DEFINING THE SOVIET AND AMERICAN BIOLOGICAL WEAPONS PROGRAMS AND THEIR PROCESSES

In order to delineate the scope of the bioweapons programs of both the United States and the Soviet Union, the explication of pertinent definitions and agents used is necessary. Biological weapons preparation and manufacture is a very delicate industry, with research and experimentation designed to increase virulence, longevity of symptoms, antibiotic resistance, and other determinants, such as shortening the incubation period, that would increase the human casualty ratio in a population and overwhelm the public infrastructure of the chosen target. For the purposes of this paper, virulence is defined as "the relative ability of a pathogen to cause death."[5]

In order for a weapon to be classed a biological weapon, it must be based on "naturally occurring microorganisms (bacteria, viruses, fungi) or toxins that can cause disease and death in a target population" and "they can also attack the food supply and/or materiel of a nation." Furthermore, biological weapons have two characteristics that increase their effectiveness as a weapon: "(1) biological agents, other than toxins, reproduce and, therefore, a small amount of infectious agent can cause disease; (2) biological agents, other than toxins, usually require an incubation period of hours to days to manifest signs of exposure so the affected [individual] is not certain whether a biological agent attack has occurred until illness sets in."[6]

The United States' biological weapons program was created in February 1942, under the auspices of the Biological Warfare Committee, created by the United States National Academy of Sciences, and it was placed under the civilian supervision of Dr. George Merck and Ira Baldwin and based at Fort Detrick, Maryland by 1943.[7] Overall, the work at the Fort Detrick facility, named Camp Detrick, dealt with "pathogen identification, modes of transmission, infection, detection, public health measures, containment, rapid drying of organisms, and packing for delivery."[8] The escalation of the United States program during World War II stems from:

> the Office of Strategic Services alert[ing] to the Joint Chiefs of Staff in December 1943 to indications that the Germans might be planning to use BW. The BW process was accordingly stepped up and, in June 1944, the complete program was transferred by direction of the President to the War Department. At the direction of the Secretary of War, the Chemical Warfare Service was made responsible for work on BW agents, for BW intelligence, and for BW defense. . . . The R&D program was greatly accelerated with the addition of field testing facilities and a production plant.[9]

At the height of the bioweapons program, the United States had four installations: the main research and plant at Fort Detrick, a field testing site in Mississippi established in 1943 and one in Utah (Dugway Proving Ground) in 1944, and a production plant in Indiana (Vigo Ordinance Works) established in 1944.[10] According to most of the released documents on Fort Detrick, the scientists focused their efforts on the cultivation of anthrax and agricultural pathogens that would effect "Japanese rice and German potatoes" and the arduous work included:

> coax[ing] the anthrax bug into its best form. Toward the end of tis growth cycle, they used heat or chemical shock to force the rod-shaped bacteria to convert into spores, a dormant state. When the process worked properly, the spores were very

> hardy, resisting heat, disinfectants, sunlight, and other environmental factors. Anthrax spores had been known to remain viable for decades. The scientists harvested the spores and put them into weapons. Upon being inhaled, the spores would convert back to rods and establish an infection."[11]

Furthermore, the scientists at Fort Detrick also utilized scientific knowledge of the toxins produced by bacterium and researched pathogens, such as botulinum toxin, as "a tactic that sidestepped the necessity of infection and instead yielded deadly toxins that could be sprayed directly on foes."[12] The United States received the same intelligence on Japanese Unit 731 during World War II and gathered intelligence after the capture of the Manchurian outpost by offering Shiro Ishii, the unit's chief, and other upper echelon associates immunity from prosecution contingent on the translation of important documents while the Soviet Union was gathering the same intelligence to use for their own biological weapons program.[13] Unlike the situation in the Soviet Union, the United States biological weapons program experienced criticism for its aim of creating both defensive and offensive weapons to use in case of global aggressions. One such detractor, Theodor Rosebury, derided the possible use of biological weapons in Peace or Pestilence (1949) and "warned that the field's promises were illusory and that its munitions had no real military value, since the outcome of germ attacks would always be impossible to predict or control."[14]

The loophole in the United States production of retaliatory biological weapons stems from the fact that the Geneva Gas Protocol of 1925 was not ratified until 1944 and by the end of World War II the wartime facilities were decommissioned to research facilities.[15] The Vigo Ordinance Works, which was supposed to provide the United

States with aerial bombardment capabilities "ceased operation before infectious BW agents production began."[16] Fort Detrick would remain the main research facility for the production of defensive biological research and would remain one of the major installations that would conduct investigatory programs into the efficacy of the Soviet biological weapons program. The United States' program would produce amounts of pathogenic materials, both in slurry and dried forms, but the Soviet Union would ultimately outpace the American stockpiles of disease due to the fact that the program was decommissioned by President Richard Nixon in 1969.

Moreover, in order to highlight the veracity of the evidence of biological weapons production, the materials crucial for protection must be noted due to the fact that in many of the reports of the Soviet bioweapons program only the structural aspects of the program were detected, not the actual pathogenic stockpiles, with one major exception in Sverdlovsk in 1979. Overall, the design of the biological processing plant is highly different from a biomedical research facility and "there is a clear distinction between processing protective agents to be used for countermeasures or personnel performance enhancement."[17] For the production of biological materials for use as weapons of mass destruction, the facilities "require . . . fermenters or single cell production capabilities . . ., including smooth, highly polished stainless steel surfaces, self-containment capability, and negative pressure conditions."[18] The fermenters become the prime indicator of the existence of a Soviet biological weapons program and the United States conducted heavy

intelligence operations, particularly during the 1950s to the 1970s, in order to ascertain probable sites of bioweapons research and manufacturing facilities.

The United States used some of the same equipment to manufacture an arsenal of biological weapons to use in the case of a major Soviet violent incursion into the geopolitical landscape. In the case of fermenters, the United States installed this type of equipment with a massive capability of production at the Vigo Ordinance facility in Indiana, even though the use of such fermenters would not be utilized by the end of World War II. Early on in the United States biological weapons program, particularly in terms of the replication of virus material to be weaponized for bombs and other dissemination processes, the utilization of chicken eggs was a major source of biological agents for repository and use as a retaliatory weapon. During the 1950s, Fort Detrick utilized chicken eggs as incubation apparatus for virus replication because they are "cheap and simple to procure, [and] are rich in the proteins and nutrients needed for viral growth and reproduction [as well as] surrounded by a hard shell that makes them easy to handle."[19] Just as in the case of modern vaccine research and production, Fort Detrick used the value of the easy portability and potential for replication to amass a large amount of biological agents within a short amount of time, in fact that replication process was mechanized much like an assembly plant in order to effectively produce the amount of pathogens needed in the case of a hot war or zero sum game event with the Soviet Union.

Another area to focus on in the biological production process is the issue of

stability and dissemination. Stability issues plagued the Soviet bioweapons program because of "the susceptibility of the biological agents to environmental degradation, not only in storage but also in application."[20] Stabilization processes must account for a high amount of variables, including "exposure to high physical and chemical stress environments, such as high surface at air-water interfaces (frothing), extreme temperatures or pressures, high salt concentrations, dilution, or exposure to specific inactivating agents."[21] Overall, bioweapons programs, particularly the Soviet Union's specialized program, utilized a variety of stabilization processes with divergent results. In order to retain the stabilization of various pathogenic agents, from viruses to bacterium, a system included "initial concentration; direct freeze drying (lyophilization); direct spray drying; formulation into a special stabilizing solid, liquid, or sometimes gaseous solutions, and deep freezing" and concentration practices included "vacuum filtration, ultrafiltration, precipitation, and centrifugation."[22] Most toxic agents utilized, such as Clostridium botulinum (botulism), were stabilized by freeze-drying a powdered form and encapsulation, while infectious pathogens are stabilized by a variety of methods, dependent on the relative strength of the agent or if it is able to produce encapsulating endospores, and then spray dried.[23]

In the United States, the use of stabilization processes, especially for smallpox centered on the lyophilization process (freeze-drying). One of the problems that American scientists encountered with the stabilization of the smallpox pathogen as a viable biological weapon is the fact that they needed it to be more durable in suspension

to be loaded into any type of dissemination process. Smallpox did not degrade under the drying process and in many instances "the process was so efficient it could make agents too strong" and "one solution was to dilute the dried agent with inert material."[24]

Dissemination protocols for biological agents is also dependent on the relative stability of the suspension and, in most instances, aerosolization of the pathogens is a preferred method. Overall, the dispersal methods of biological weapons includes "aerosol dispersal using either spray devices or through incorporation of agents with explosive devices (cluster bombs, missile warheads with submunitions designed for extended biological agent dispersal)."[25] One of the problems with the use of bombs and warheads is the ability to stabilize the agent to endure the rapid and high heating process that the explosive process entails to detonate and release the pathogens and usually only anthrax is deemed resistant enough to survive this particular dispersal process.[26] The success rate of biological agents dispersed by warheads or other explosive means "is much less efficient (~1-5 percent)."[27] Other approaches to dispersal methods are "the use of a pressurized gas in a submunition[,] . . . small rotary-wing vehicles, fixed-wing aircraft fitted with spray tanks, drones, bomblets, cruise missiles, and high-speed missiles with bomblet warheads."[28] The dispersal methods by these other means, without the use of extreme heat, is much more effective, with "dissemination efficiency rates . . . in the range of 40-60 percent."[29]

In further defining the Soviet biological weapons program, one must take into account the various programs and their coded names to keep track of the sophistication

and specialization of the Soviet research and manufacturing practice. Each department was charged with differing aims within the bioweapons program and the naming practice denoted its mission. Project Factor was charged with boosting the virulence factor of the chosen pathogens, Project Bonfire the enhancement of antibiotic resistance, Project Flute attempted to create "mind-altering compounds," Project Ferment worked with enhancing genetic engineering of new pathogens, Project Foliant dealt with chemical weapons, and Project Ecology worked with creating pathogens to devastate crops and livestock populations.[30] Furthermore, codes were enacted to "keep track of all the pathogens and branches of the program[,] [b]acteria were identified by the prefix "L" . . . [hence] [p]lague was L1, tularemia L2, brucellosis L3, and anthrax L4" while "viruses were "N" [and] [s]mallpox was N1, Ebola was N2, Marburg N3 and so on."[31]

The Soviet bioweapons program functioned as both a military and civilian installation with a delineation between the two in the mid-twentieth century (a topic to be discussed in Chapter IV). While the United States did create a functioning bioweapons program, the relative success of its efficacy in creating a stockpile of pathogenic agents is constrained by the time constraints placed upon by the United States government, a constraint that the Soviet Union did not have, highlighting a global security concern over the proliferation of Soviet bioweapons and the relative security of these caches after the collapse of the Soviet Union apparatus.

CHAPTER III

HISTORICAL BACKGROUND: 1920-1945

In order to fully comprehend the breadth of what would become the twentieth century arms race between the United States and the Soviet Union, the history of the Soviet biological weapons program must be accounted. The Soviet biological weapons program became one of the largest and most sophisticated programs of the period, one that outdates the United States program. The Soviet program is influenced by the early anti-plague system, that has its roots in nineteenth century tsarist Russia, expands during the early twentieth century, and finds its final deadly germination in during the period during and after World War II, specifically influenced by the Japanese biological weapons efforts and the United States' advancement in nuclear weaponry. The search for stable biological weapons is arguably influenced by the destabilizing effects of World War II on the geopolitical landscape, as well as the tumultuous political landscape within the Soviet Union and aims of territorial consolidation espoused by Josef Stalin and subsequent Soviet leaders.

The program that would become the massive manufacturing machine of the Soviet bloc has finds its basis in tsarist Russia as a program whose utility was in combating epidemics. Prior to 1800, most systemized attempts to ameliorate epidemics in Russia centered on the argument from the Russian medical community that "all plague outbreaks were imported from abroad in the course of commercial activities or warfare"

and thus "the preventive measures implemented by public health authorities had a temporary character and lasted only for the duration of an epidemic or outbreak."[32] Due to the natural occurrence of pathogens, such as tularemia and plague, an institutionalized program to combat epidemics was crucial, especially with the virulence of these diseases that would often decimate cities and provinces across the Russian territory. The temporary localized response programs found during this period set the tone for later established programs, notably in terms of "the publication of guidelines providing instructions to local authorities on setting up quarantines, treating affected people, and preventing the spread of the disease, notably by controlling communications with affected areas."[33] The temporized response also created a centralized non-permanent commission that was charged with the transmission of standardized identification and treatment protocols and establishing quarantine checkpoints at the borders of epidemics.[34]

The creation of the Special Commission for the Prevention of and Fight against Plague (KOMOCHUM) in the late 1800s to early 1900s as a permanent governmental body to monitor and implement strategies against epidemics is the predecessor of the anti-plague system and largely regarded as the basis upon which the Soviet biological weapons program is founded. A research institute, the Imperial Institute of Experimental Medicine, was created in conjunction with the Special Commission in order to study yersinia pestis and "several field laboratories were established in areas where frequent epizootics occurred, and medical observation posts were set up at the borders and maritime ports to monitor these areas and prevent the importation of the disease."[35] The

imperial anti-plague system highlights the innovations of the Russian scientific community because of the fledgling response units and systematized reporting system that would become the basis of all regional and global disease monitoring agencies, such as the American Centers for Disease Control and the global World Health Organization. The success of the early imperial anti-plague system worked against inherent structural and regional problems found within the nineteenth century, namely "the population's ignorance of the public health threat posed by plague . . . and an overall shortage of dedicated medical personnel capable of enforcing those measures."[36]

A special emphasis on the Imperial Institute of Experimental Medicine (IIEM) at Fort Alexander is crucial to historical account of the creation of the Soviet Union's biological weapons program. The Institute's creation in 1890 signaled "not only the first organization specializing in AP [anti-plague] research but also the first scientific research institute of Russia"[37] and its existence after the Bolshevik Revolution and beginnings of the Soviet Union would aid in the creation of the biological weapons program. The main objective of the institution was "to determine the causes of plague as well as other highly infectious diseases and to develop new methods for treating them."[38] The initial purpose of the institute to study plague was expanded in scope to include other highly infectious diseases, including "cholera, anthrax, spotted typhoid, paratyphoid fever, tetanus, and scarlet fever" and "between 1898 and 1917, the AP [anti-plague] laboratory manufactured 1,103,129 vials of sera against staphylococcal and streptococcal infections, tetanus, and scarlet fever" and "produced 4,795,384 cubic centimeters of plague vaccine, 2,343,530

cubic centimeters of plague serum, 1,999,097 cubic centimeters of cholera vaccine, and 1,156,170 cubic centimeters of cholera serum."[39] The rapid proliferation of vaccines and sera materials during a nineteen year period highlights the efficacy of the structural framework of the future biological weapons program and foreshadows the massive proliferation of biologics during the Cold War.

The Soviet Union restructured and expanded the anti-plague system starting in the late 1920s and until the late 1950s. Prior to the mid-1920s, "the Soviet AP system was essentially composed of facilities created during the tsarist period with only three new laboratories and one institute created by the Soviet state."[40] The expansion of the anti-plague system that began in the late 1920s is the germinal stage that would lead to the incorporation of certain parts of the structure into the Soviet biological weapons program and the late 1920s phase "was characterized by a shift from the previously exclusive focus on the containment of outbreaks to the prevention of future outbreaks" and "the AP system was enlarged to 87 facilities, strategically located throughout the Soviet Union."[41] The period of the 1920s is extremely important to note in the discussion of the history behind the biological arms race of the Cold War because it is the period that "saw much scientific progress, primarily in understanding the transmission mechanisms of plague and other dangerous infectious diseases, and in the development of new treatment methods."[42]

One of the unsettling problems during the early part of the twentieth century is the lessons learned after the Bolshevik Revolution and the Russian Civil War. During the

war in the Crimean Peninsula, a preponderance of casualties from 1918 to 1921 stemmed from a typhus epidemic, which made an impression on the military leadership of the Red Army. According to Ken Alibek, even though the Bolshevik leadership "knew nothing of the history of biological warfare, they could recognize that disease had served as a more potent weapon than bullets or artillery shells."[43] By 1928, the Revolutionary Military Council had "signed a secret decree ordering the transformation of typhus into a battlefield weapon[,]" even though the early Soviet government had signed the Geneva Protocol in 1928. Although other treaties were in place with major European powers over the use of asphyxiating gases and agents in war, the Geneva Protocol is crucial to the understanding of the problematic nature of the Soviet Union bioweapons program. According to the treaty:

> That the High Contracting Parties, so far as they are not already Parties to Treaties prohibiting such use, accept this prohibition, agree to extend this prohibition to the use of bacteriological methods of warfare and agree to be bound as between themselves according to the terms of this declaration.

Since the Soviet government had signed this binding treaty on April 5 1928, the burgeoning biological weapons research and implementation program was a clear violation of stipulations of the document. The United States is also guilty of developing a bioweapons program in parallel with the Soviet Union, but Nixon decommissioned the program's continued development in 1969, thus making the Soviet Union a clear threat to global security due to continued production until the collapse of the Soviet government on December 26, 1991.

Reports by Ken Alibek note that the early Soviet biological weapons program was placed under the control of the State Political Directorate (GPU), which was the predecessor of the KGB and the weapons program would remain under a security organization's control until the restructuring of Soviet government and institutions in the early 1950s.[44] During the period from the 1920s until World War II, there was no known way to control against a typhus epidemic and its virulence was one of the reasons behind its choice as an early biological weapon. The incubation period of the disease is another reason for its selection because "around seven to ten days after infection, victims will abruptly develop the first symptoms, beginning with throbbing headaches and a high fever" and, since the ricksettsiae targets the cell walls of blood vessels, "tissues become inflamed . . . triggering a rash that spreads over the body [and] spots of gangrene will sometimes appear on . . . extremities as blood circulation slows down."[45] The virulence of the disease is an effective weapons choice because it is fatal in forty percent of cases without treatment.[46] During the 1920s and 1930s, the manufacturing process for biological weapons was in its infancy and its methods were crude, highlighting a lack of scientific understanding of the weaponization of pathogens because the early manufacture of "weaponized" typhus included breeding ricksettiae "in chicken embryos or in live animals such as rats that were killed when the concentration of pathogens was highest and were liquefied in large blenders" and then "the liquid was . . . poured into explosives."[47]

The parameters of the Soviet anti-plague system began to evolve during this period and the early center for the biological weapons program was at the Leningrad Military Academy and early Soviet hints about the program was noted by senior defense officials, notably Marshal Kliment Voroshilov, who argued that despite the Soviet Union's adherence to the Geneva Protocol, "'should our enemies employ such methods against us, then I can tell you that we are ready — quite ready — to employ them against an aggressor on his own soil.'"[48] Soviet officials continually expanded the biological weapons program during this period and scientists from the Leningrad Military Academy were sent to the White Sea, particularly Solovetsky Island (which would later become the heart of the Gulag Archipelago), where they worked on typhus, Q fever, glanders, and melioidosis.[49] Further expansion of the anti-plague system, much of which would be incorporated into the Soviet biological weapons program, occurs during the 1930s and 1940s. Lenin's New Economic Policy aided in the rapid expansion of the system and "the Rostov and Irkutsk AP institutes were established in 1934 [and] the Almaty Insitute in Kazakhstan . . . was founded in 1949."[50]

One of the problems with the historical accounts of the creation of the biological weapons program during the early nineteenth century is the relative lack of concrete evidence, specifically evidence collected by the United States, in terms of firm numbers of anti-plague institutes involved in early pathogen production and the aims of the Soviet government. The current study is forced to rely on intelligence collected by Ken Alibek, a noted biological weapons scientist involved at the ground level of the Soviet program,

as well as a senior leader of certain aspects of the program. Some of the evidence noted by Alibek must be taken at face value, namely that the author has no other reason to reveal the information from the 1920s and 1930s beyond that of chronicling the history of the Soviet biological weapons program. The Alibek chronicle of the Soviet bioweapons program also highlights an inability of those with intimate knowledge of the structure and history to ascertain the truth from fragmented Soviet records of previous pathogen experiments and progress reports on the weaponization of specific diseases. Alibek notes that during the 1930s, the reports concerning melioidosis were:

> intentionally vague as to whether humans were involved, but the way the case reports were arranged — with nineteen in one group, eleven in another, and twelve in another — suggested an irregular pattern not usually associated with animal testing. And the symptoms described could only have been experienced by human subjects. There have been repeated allegations in the West about Soviet germ warfare experiments on humans, but I have seen no other reports to indicate that these took place after the 1930s.[51]

Alibek's account of the program during World War II is also refuted by other scholars, specifically in the case of a tularemia outbreak during the Battle of Stalingrad, but without hard evidence refuting these accounts, both arguments over the introduction of tularemia and Q fever in conflicts between Soviet and German forces can be entertained in this study in order to highlight a recurring problem with monitoring the manufacture, usage, and destruction of biological weapons.

The background of World War II sets the stage for the third phase of construction of what would become a highly systematized series of research institutes and manufacturing plants that spread across the expanding Soviet bloc. As previously

mentioned, the Soviet military and political echelon was preoccupied with anxieties regarding chemical and, more importantly, biological warfare. The previous research and production of vaccines began to shift during this period, with an emphasis placed on the production of offensive and defensive weapons. During the war, laboratories in Leningrad and Solovetsky Island were crucial to Soviet defenses and when the Nazis invaded in 1941, military leaders ordered that the personnel and equipment from both sites be evacuated. Initially the laboratories were sent to Gorky, but because of German aerial bombardment, the final destination for the biological research centers was in Kirov. According to Alibek, "the commanders of the expedition expropriated an army hospital for the severely wounded on Oktyabrsky Prospekt . . . and the equipment was hastily reassembled."[52] Two different pathogenic outbreaks during World War II are ascribed to biological warfare in Ken Alibek's account of the Soviet bioweapons program. The initial reports from Soviet military leaders provided by Alibek note that an outbreak of Q fever "among German troops on leave in Crimea in 1943 was the result of an attempt to use another one of the biological warfare agents developed by his facility" due to the fact that "Q fever was practically unheard of in Russia prior to that outbreak."[53]

Alibek also provides evidence that the tularemia outbreak at the Battle of Stalingrad in the period from August 1942 to February 1943 was another instance of Soviet biological warfare with unintended consequences because "the [bioweapon] objective was reversed after the . . . outbreak among [Soviet] soldiers at Stalingrad."[54] Alibek's investigation into this outbreak is based "on the hundreds of thousands of

tularemia infections that quickly rose at the beginning of the siege and the collaborative statements of an elderly lieutenant colonel in the Soviet Red Army" and he also highlights "a significantly high [70%] pulmonary involvement among those infected with tularemia on both sides, suggesting man-made, airborne dissemination."[55] According to research by Heinrich Kliewe, in 1942 it was posited that there was a program of experimentation on the Isle of Wosroschdenije and "the bacteria emulsions were supposedly filled in 'tanks' fastened to motor vehicles. They were dispersed as microbe clouds under high pressure in the direction of the wind; also little glass balloons and infected metal darts were dropped from airplanes.'"[56] Furthermore, most of the German researchers could only hypothesize that "'[o]nly the employment by the [BW] agents [presumably studied by the Russians] in the hinterland, mainly in Warsaw, and few other large places in the zone of communications such as Kiew and Minsk could be ascertained by the Germans.'"[57]

The problem with Alibek's account of the battle is the fact that the reverse argument can be made, namely that the tularemia outbreak was a naturally occurring event, one indicative of the geographical location and the variables found within military conflict. According to Alibek's critics, the transmission of tularemia was not well understood and it was unknown if the disease had a primary pulmonary form. One of the more problematic areas of this conflict over the tularemia outbreak is the fact that "the Rostov region alone already had 14,000 tularemia cases in January 1942, several months before the major Panzer assault on the city" and due to the war there was a "large

epizootic pool of *F. tularensis* among mice and water rats (and a severely if not completely disrupted hygiene and sanitation system."[58] Critics note the preponderance of Soviet epidemiological work on tularemia at the Battle of Stalingrad, with evidence pointing to the natural routes of transmission: lack of public health infrastructure, inhaled dust from infected straw, living in close quarters with infected rodents, eating contaminated foodstuffs and drinking from wells contaminated by deceased infected rodents, and the possibility of transmission via a mosquito vector.[59] One of the problems with taking this evidence as completely neutral and viable is the fact that it is gleaned from Soviet reports, memoirs, and scientific papers and the fact that the Soviet Union is already shrouding their anti-plague systems and bioweapons program in secrecy.

Regardless of the truth of the tularemia outbreak at the Battle of Stalingrad, one undeniable truth is found within the competing historical narratives of this period, namely that both the Soviet Union and the United States worked with this pathogen in an attempt to weaponize it and both authors note that "during the now defunct U.S. BW program, tularemia was weaponized by freeze drying bacteria-laden slurry and milling it into a fine powder for aerosol delivery."[60] Not only did the United States and the Soviet Union produce tularemia as a biological weapon, but other countries, such as Japan and France, also worked on increasing the ability of this pathogen to be utilized as weapon. The presence of tularemia as a pathogen of interest is also problematic due to its classification by the CDC Strategic Planning Workgroup, which "placed F. tularensis in that category of biological agents that 'have the greatest potential for adverse public health impact with

mass casualties.'"[61] The possibility of active experimentation by the Soviet Union bolsters the argument that their bioweapons program was further advanced than many Western powers believed by World War II and the lack of accurate intelligence highlights one of the problems with ascertaining the breadth and advancement of the Soviet bioweapons program, one aspect of international relations during the twentieth century that would plague the Western world during the height of the Cold War.

The final event during the period from 1920 to 1945 is the discovery of parallel Japanese biological weapons research with the seizure of a Japanese military outpost in Manchuria in September 1945. Soviet troops successful overrun the Water Purification Unit 731 installation and evidence of Japan's bioweapons program was finally discovered. According to many sources, "rumors of the unit's activities in northern China had been circulating in Russia and the West since the late 1930s."[62] Japan's drive for biological warfare supremacy was spurred by the June 17, 1925 Geneva Protocol and the belief by military personnel that Japan could protect itself as a world power by utilizing the very same weapons that other countries were vowing not to use in modern warfare. According to most reports, "the Japanese biological weapons program included four biological warfare units in China between 1936 and 1945" and a large-scale bioweapon attack occurred in 1940 with "Japanese aircraft . . . dropp[ing] ceramic bombs containing plague-infested fleas, and grain to attract rats, in a series of field tests of aerial biological bombs on eleven Chinese cities."[63] According to seized documents and the testimony of Japanese prisoners of war, "the unit, commanded by Lieutenant General Shiro Ishii,

experimented with anthrax, dysentery, cholera, and plague on U.S., British, and Commonwealth POWs."[64] By the end of World War II, the Soviet Union had achieved their initial aims in the creation of a biological weapons program because it "had acquired and weaponized a group of biological warfare agents they referred to as the golden triangle: plague, anthrax, and cholera" partially due to the seizure of pertinent information from the Japanese Unit 731, "including 'blueprints for biological warfare assembly plants, far larger and more complex than [their] own.'"[65] During this period Josef Stalin was heavily involved in the creation of the biological weapons program, noting the role of science in furthering Soviet political and military aims, and with the introduction of the Japanese intelligence he orders that the plans "be used to build a military research facility in Sverdlovsk."[66]

Throughout the period of the 1920s to the end of World War II in 1945, the Soviet Union was quickly building the infrastructure and repository of pathogenic agents crucial to the rapid development and escalation of a Cold War arms race based on unseen weapons that can and would devastate populations. As the Cold War begins to solidify in the 1950s, both the United States and the Soviet Union would be concerned with new weapons systems and, while the global landscape is preoccupied with an overt nuclear war between the two superpowers, the potentiality for a clandestine biological warfare event is also a looming threat in the political landscape.

CHAPTER IV

THE COLD WAR ARMS RACE AND PROLIFERATING BIOWEAPONS

By the end of World War II, the Soviet biological weapons program was beginning to conceptualize its final structure as both a military and civilian industry focused on manufacturing massive amounts of pathogenic materials in the case of United States aggressive maneuvers within the context of the Cold War. The period of the twentieth century is ostensibly divided into three different phases of biological weapons research and production: the "classical" era (1928-1972), the "modern" era (1973-1991), and currently the third era, the "contraction and denial" era (1992-present).[67] The delineation of the two sections of the classical period into two different chapters, Chapters III and IV, was chosen in order to structure the background of the Soviet biological weapons program (the period of 1928 to 1945) before explicating the period in which much of the biological weapons proliferation took place (1949 to 1992).

During the classical period of the Soviet Union's biological weapons program, the defining research methods involve the so-called "classical microbiological techniques of mutation, selection, and propagation to weaponize pathogens such as *Bacillus anthracis*, *Francisella tularensis*, *Yersinia pestis*, and *Ricksettsia prowazekii*, the causative agents of anthrax, tularemia, plague, and typhus, respectively."[68] The breakthrough during this period is the discovery of recombinant DNA during the 1970s, which caused a shift from the "classical" era to the "modern" era due to the use of modern molecular biology,

wherein the Soviet Union would create an employ an institute designed to deal with recombinant DNA under the civilian directorate of the Soviet Union's biological weapons program.

During the 1950s, the scientific advancements surrounding recombinant DNA broadened the Soviet Union's research interests in terms of expanding the scope of available agents. Ken Alibek notes that "a few experts recognized that the ability to manipulate genes broadened the horizon of bioweaponeering, offering the possibility of producing new strains capable of overcoming vaccines and antidotes" and it also "raised the disconcerting possibility that . . . competitors in the West could put us at a severe strategic disadvantage."[69] The classic period of biological weapons research is escalated into a dual program of producing increasing amounts of existing agents, while at the same time conducting genetic research on these bacteria and viruses. Alibek notes that a covert program, Enzyme, established by Soviet decree in 1973 "aimed to modernize existing biological weapons and to develop genetically altered pathogens, resistant to antibiotics and vaccines, which could be turned into powerful weapons for use in intercontinental warfare."[70]

A veil of secrecy is placed over the anti-plague system and some of the installations are subsumed into the bioweapons research industry. An expansion of the anti-plague system precipitated the expansion of the bioweapons program and and in the following decades civilian installations, especially Biopreparat, were created in order to facilitate further research and expansion into new pathogens. By the 1970s, the

expansive biological manufacturing plants were churning out massive amounts of weaponized infectious diseases and in 1971 the biological accident in Sverdlovsk illuminated the machinations of the Soviet Union to the United States, creating a question of compliance with several treaties, most notably the Biological and Toxin Weapons Convention (1972).

In terms of information, most of the intelligence about the apparatus of the Soviet biological weapons program comes from the civilian arm of the organization, namely the Biopreparat facility and its scientists. Two organizations, military and civilian, are created to direct the bioweapons research for the bulk of the twentieth century until the fall of the Soviet Union. The military side of the biological weapons program was headed by the Ministry of Defense and included the Institute of Microbiology (Kirov), Institute of Military Technology Problems (Sverdlovsk), Institute of Virology (Zagorsk), and Vozrozhdeniye Island field test facility (Kazakhstan/Uzbekistan).[71] The civilian side of the program was headed by the Main Directorate Biopreparat and included the Institute of Molecular Biology "Vektor" (Koltsovo), Institute of Ultra-Pure Biopreparations (Leningrad), Institute of Immunology (Lyubuchany), Institute of Applied Microbiology (Obolensck), and Progress Scientific and Production Base (Stepnogorsk).[72] One of the problems with recreating any solid reconstruction of the whole of the Soviet Union's biological weapons program is the relative secrecy of the information, namely the fact that the Russian Federation will not release classified information into the structure, abilities, and research conducted prior to 1992 and any release of information is

punishable by incarceration.[73] Furthermore, the highly compartmentalized and regimented system used by the Soviet Union makes any intelligence gathering extremely difficult without prior knowledge of the program itself.

The expansion of the Soviet anti-plague system, and by extension the biological weapons program, began in 1951 with creation of the Kyzyl anti-plague station in Russia and the 1953 creation of the Taldyqorghan anti-plague station in Kazakhstan. Further creations include: Almaty and Shymkent stations in Kazakhstan (1956), Gorno-Altai field station in Russia (1953), Mangistau station in Kazakhstan (1967), Kishinev in Moldova (1970), Simferopol (Crimea, Ukraine), Yerevan station in Armenia (1972), and finally Tsiteli Tskaro station in Georgia (1982).[74] The second phase of the anti-plague system also saw an expansion of the pathogens being researched and "in addition to plague, typhus, cholera, malaria, brucellosis, anthrax, and tularemia, which they started researching in the previous period . . . AP scientists also began working on viral diseases such as CCHF and hepatitis."[75] According to most intelligence, the Mikrob station in Russia "started developing identification and treatment methods under the defensive BW program in the 1950s" and the other stations "were first drawn into this program in the 1960s."[76] By the 1970s, the anti-plague system became further involved in the bioweapons program under Project Ferment and stations, such as the Rostov, Volgograd, and Mikrob anti-plague institutes "executed tasks pertaining to both the defensive (Problem 5) and offensive (Ferment) aspects of the Soviet BW program."[77]

During this period of expansion and encapsulation of certain installations for biological weapons research, the United States was closely monitoring the system in the Soviet Union. Beginning in the early 1950s, the United States government utilized intelligence measures in order to gauge the geopolitical climate surrounding its adversaries interest in the proliferation of nuclear, chemical, and, especially, biological weapons. In 1956, Georgi Zhukov, the Soviet defense minister, announced at a Communist Party Congress meeting that the future of modern warfare would include biological weapons.[78] Added to the sudden announcement is the correlation of United States intelligence information gathered by U-2 planes over the Aral Sea presented to the officials at Fort Detrick, in which "the structures on the Soviet Island were unmistakably similar to the bull's-eye pattern of rings in the Utah desert, where roads, sensors, electrical poles, and test subjects were arrayed at increasing distances from germ sprayers."[79] In a 1965 report from the Central Intelligence Agency, analysts noted that "the Soviet military establishment is concerned over U.S. BW research, and [the United States] ha[s] some insight into their organization and activities for medical defense against BW attack. But [the Central Intelligence Agency] still do[es] not know their precise defense readiness posture or their specific logistical preparations."[80] The report notes the probable biological research hub on Vozrozhdeniya Island in the Aral Sea, noted by the Hirsch Report in 1951, and further research into the island yielded:

> rather extensive installations. . . . There were more than 150 buildings of various sizes grouped into two settlements about 2 1/2 miles apart. The northern and largest group of buildings appeared to be the administration, housing, and logistics area. . . . Its barrack-like buildings were large enough to accommodate

> about 1,400 people. The southern group was contained within a high walled area which appeared to be the work or 'laboratory' site. South from the 'laboratory' area tangled roads and tracks led to five centers, called 'test sites' . . . [and] at each of these centers was a tower and one or two small buildings. About three miles to the south . . . lay the small island of Konstantin, with some 35 buildings on its northern tip."

The detailed photographs of the area highlight that United States intelligence operations did discover a large biological weapons facility even though the analysts could not classify it as a biological weapons facility and test center. Further intelligence gathering occurred in 1959 with no further delineations of function, but Vozrozhdeniye Island became one of the most important areas of research and testing for the Soviet bioweapons program. According to materials released after the the fall of the Soviet Union, Vozrozhdeniye Island, also known as Rebirth Island, was chosen for remote access of its geographical location and the fact that the area was unsuitable for any agricultural or fishing industries. According to reports from scientists who worked at the facility, it was comprised of:

> a half-dozen tumbledown buildings [which] served as the scientific headquarters, as well as the barracks, for a migratory population that sometimes numbered a many as 150 people, including scientists, technicians, and a unit of soldiers responsible for firing the weapons and tying down animals. A secret landing strip had been built nearby, but airplane traffic was kept to a minimum."[81]

The facility was created in such a way that escaped major detection from Western intelligence agencies and the fact that the United States could hypothesize the extent of the possible operations highlights the effectiveness of the Central Intelligence Agency during this period. The scientific pursuits during the period of the bioweapons program highlights the unique position of the Soviet Union and its secrecy during the twentieth

century because of interior reports later released of the incidence of biological accidents during the 1970s. According to Alibek, at least one accident occurred in the surrounding area, with fishermen dying from the plague when the winds shifted and sent a cloud of the weaponized pathogen over their boat.[82] Furthermore, the scientific community noted the high incidence of plague in native rodents of the area in the 1970s and 1980s and in "1991, doctors reported outbreaks of plague in several areas of Central Asia."[83]

The information caused the reintroduction and intensification of work on retaliatory biological weapons and in 1956 Pine Bluff Arsenal in Arkansas became a hub of this pathogen manufacturing system, with a focus on viral replication and weaponization. Under the Eisenhower Administration, the weaponization program is furthered along by the introduction of research into incapacitating agents, wherein the pathogens "were nonlethal . . . [and] instead of killing, they caused lethargy, irritation, blackout, paralysis, illness, and the lack of will to fight. The effects would be temporary, . . . though minor repercussions 'might persist permanently."[84] On top of research into incapacitating pathogens, scientists for the United States military were investigating "ways to extend their storage lives from one to three years[,]" as well as concentration, usage of Rift Valley Fever, and "'tailored variants'" of existing pathogens.[85] During the John F. Kennedy Administration, research into incapacitating agents soared and "the virus work, already a high priority, was redoubled, and such companies as General Electric, Booz-Allen, Lockheed, Rand, Monsanto, Goodyear, General Dynamics, Aerojet General, North American Aviation, Litton System, and even General Mills . . . joined the

germ program."[86] Pentagon officials moved onto dispersal systems with the increased biological weapons research and production, readying "a half dozen missiles for biological warheads, including the Pershing, the Regulus, and the Sergeant" and in order to receive realistic results on the dissemination effects in a variety of climates "testing was undertaken in Okinawa, Panama, . . .the Central Pacific[, and] Alaska."[87] The expansion of the biological weapons program under the Eisenhower and Kennedy Administrations highlights how dangerous the United States viewed the Soviet potentiality for a sophisticated biological weapons program.

The Soviet response to the geopolitical landscape, particularly the perceived threat of a United States' biological weapons program, was to intensify its efforts in creating lethal and highly virulent biological weapons that would devastate populations. According to Soviet scientists, while "American scientists restricted themselves to developing armaments that could be countered by antibiotics or vaccines, out of a concern for protecting troops and civilians from potential accidents[,]" Soviet officials "decided that the best agents were those for which there was no known cure."[88] In this capacity some of the anti-plague institutes and stations were involved in the production and research of lethal pathogens. The involvement of these facilities varied by site and "some devoted most of their activities to the BW effort, while others worked exclusively on public health issues."[89] One of the problems with the supposed differences between the two types of institutes is the fact that "military officers headed the two leading AP institutes — Mikrob and the Rostov AP institute — which oversaw the work of all other

AP facilities . . . implies that scientific findings and achievements of the entire AP system were made available to the military when relevant."[90] The scientists employed at these facilities also worked closely with various programs, both public health and biological weapons research, highlighting the ability of the Soviet military to oversee these institutes and utilize non-related biological research to further the bioweapons program.

As mentioned earlier, much of the bioweapons research focused on lethal pathogens, including anthrax, Bolivian hemorrhagic fever (Machupo), botulism, brucellosis, cholera, Crimean-Congo hemorrhagic fever, Ebola hemorrhagic fever, glanders, Korean hemorrhagic fever, malaria, Marburg hemorrhagic fever, plague, smallpox, and tularemia.[91] During the 1970s, the supply of biological pathogens into the Soviet Union was extremely easy, moreover the trafficking of these agents was legal and not regulated by international law or investigative bodies, and "in the name of scientific research, [Soviet] agents purchased strains from university research laboratories, and biotech firms around the world with no difficulty."[92] The Soviet Union was well-versed in the obtainment of these pathogenic agents and had outposts in all parts of the world, from Western Europe to Asia, Africa, and South America with instructions to monitor the discovery of new or unusually lethal diseases. According to defected scientists, "it was from the United States . . . [the Soviet Union] obtained Machupo, . . . [they] picked up Marburg, related to the Ebola virus, from Germany."[93] One of the largest suppliers of these pathogenic starters was the KGB, which was also known in the civilian biological weapons laboratories as "Capturing Agency One" and "vials arrived in [the Soviet Union]

almost every month with exotic fluids, powders, and cultures gathered by . . . intelligence agents in every corner of the globe."[94] The period of the 1970s saw the creation of the Biopreparat installation[95] and its principal aim was "to raise the design and production of BWs to a qualitatively new level by using the latest advances in molecular biology and genetics."[96] The role of scientists at Biopreparat was to use the new technologies involved in recombinant DNA in order to alter the structure of bacteria and virus material in order to create situations in which the diseases would be rendered untreatable and cause vaccination processes to be ineffective.[97] At its inception, Biopreparat was forced to create "reagents, enzymes and components of media for bacterial and viral cultivation"[98] that were otherwise unavailable in the Soviet Union during this period. At the peace of the Soviet infrastructure in the 1980s, Biopreparat "employed more than thirty thousand people, about half of the sixty thousand Soviets engaged in biowarfare, at one than one hundred facilities throughout the Soviet Union."[99] The budget for Biopreparat alone was annually around $1 billion and "had stockpiled plague, smallpox, anthrax, and other agents for the intercontinental ballistic missiles and bombers aimed at New York, Washington D.C., Los Angeles, Chicago, Seattle, and other American cities."[100] In short, while the United States had a flourishing military-industrial complex in effect during the middle and latter part of the twentieth century, as evidenced by the number of American businesses engaged in biowarfare work during the 1950s and 1960s, the Soviet Union was ultimately a military-industrial complex with no purely civilian industries engaged in consumer goods or services.[101]

By the 1970s, the Soviet military doctrine had separated the use of biological weapons into three different categories, "strategic biological weapons, operational biological weapons, and strategic-operational biological weapons" and overall these weapons were delineated on the basis of the virulence of the pathogenic agents used.[102] According to Ken Alibek, "contagious agents such as smallpox and plague were intended for long-range, strategic attacks against the territories of the United States, Great Britain, and some other European countries, because nobody wanted to use these weapons close to [Soviet] troops."[103] On the other hand, operational biological weapons "were intended for use against deep military targets about 100 to 150 kilometers behind the front lines, such as rear services and reinforcements" and the agents used, "such as tularemia, brucellosis, glanders, and Venezuelan equine encephalomyelitis [VEE], would not generally kill soldiers, but would incapacitate them and thereby make it easier to destroy an enemy's defenses."[104] The final category of Soviet biological weapons, strategic-operational weapons, "would be used to strike both strategic and operational targets" and in these types of situations "agents such as anthrax and the rickettsial disease Q fever."[105] The classification system employed by the Soviet Union highlights an increasingly sophisticated utilization of procedural and structural frameworks within the military and civilian biological weapons program, denoting a high preoccupation with the maximization of product, in these terms highly infectious biological weapons, in order to prepare for any possible attack.

The Soviet Union, particularly during the 1970s and on, would develop sophisticated dissemination processes involving the use of new warheads and missiles. For most operational weapons, the use of medium-range bombers, such as the Ilyushin-28 retroactively engineered with a two-ton capacity spray tank, was utilized because it could cover a target area of approximately 3,000 to 4,000 kilometers.[106] Additionally, the Soviet Union devised a bomber unit with the capability of reaching significant targets in Western Europe had the capacity for 500-kilogram cluster bombs fitted with approximately 110 bomblets per bomb and developed single-warhead missiles in the 1960s.[107] According to defected scientists, the SS-18 intercontinental ballistic missile would be able to reach New York City and cover approximately fifty percent of the population.[108] Alibek further notes continued research into the dissemination processes of the Soviet biological weapons program in the 1970s that outpaced the technology of the United States due to the Nixon Administration's decommission of the program in 1969. Overall, the Soviet Union was able to develop "small melon-shaped bomb lets, which were packed into warheads and aerial bombs" which was vastly superior to the United States weaponry in regards to biological capability. One of the reasons for the preoccupation with biological weapons as a probable first line of defense against the United States and Western Europe is the ongoing nuclear arms race and questions surrounding the weapons system superiority between the two countries. For the most part, from the period of the 1950s to the 1970s, the United States and the Soviet Union were evenly matched on the amount of enriched radioactive materials and weapons

system for the dispersal of massive retaliatory missiles and warheads. Each country is matching its enemy with advancements for short-range (SRBM), intermediate-range (IRBM), medium-range (MRBM), and long-range (ICBM) missiles and the capability for multiple independently targetable reentry vehicles (MIRVs), so the need for a different source of retaliatory weaponry, especially one that can devastate an opposing army without the cataclysmic destruction of Soviet military personnel, political leaders, and Soviet civilians as collateral damage. Although both the United States and the Soviet Union feared the possibility of mutually assured destruction, both sides wanted to create weapons that would work on the opposing superpower in order to avert such a future.

Alibek's rhetoric surrounding the possible targets of the biological attack, i.e. the United States, Great Britain, and other Western European countries, displays an increasing paranoia on the part of the high-ranking military and political leaders of the Soviet Union, whereby the contingency plans being formulated involve multiple targets due to the multiple enemy states found along its borders, with the United States as the head nation that would spearhead the attempt to aggressively combat the sovereignty of the Soviet Union and its satellite states. Furthermore, Alibek notes that the focus of the Soviet biological weapons program centered on the Project Factor (virulence) and its adjacent departments, including Project Ferment (genetic engineering) and Project Bonfire (antibiotic resistance), instead of focusing on weapons based on toxins. According to the scientist, "the last significant attempts to develop toxin weapons were undertaken in the 1970s, probably up to 1975" due to the fact that the Soviet officials

wanted massive amounts of biological weapons in order to saturate a given target area and since toxin weapons do not replicate, the morbidity and mortality rates of a biological attack using a toxin weapon would not equal the efficacy of a traditional biological weapon utilizing bacteria or virus materials.[109]

One of the problems with the massive proliferation of biological weapons technology and pathogens is the presence of several treaties designed to curtail the proliferation of cataclysmic weapons designed to aid in the theory of mutually assured destruction, most notably the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and Their Destruction (1972) and the Interim Agreement Between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with Respect to the Limitation of Strategic Offensive Arms (1972). For the purposes of this paper and clarity, I will refer to these two agreements as the Biological and Toxin Weapons Convention and the SALT I treaty from this point forward. Both of these agreements work to constrain the massive proliferation of weapons, both biological and nuclear, within the Cold War landscape, but the violations of these agreements, particularly on the part of the Soviet Union highlights a problematic area of violation that has blowback on the current global security landscape.

The Biological and Toxin Weapons Convention delineates the role of the binding document in the geopolitical and armament landscape, with an attempt to achieve:

the prohibition and elimination of all types of weapons of mass destruction, and

convinced that the prohibition of the development, production, and stockpiling of chemical and bacteriological (biological) weapons and their elimination, through effective measures, will facilitate the achievement of general and complete disarmament under the strict and effective international control.[110]

In Article I of the Convention, the document prohibits the development and production of "microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes" and "weapons, equipment, or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict."[111] Article II expands on the ban against the proliferation of biological weapons and agents of infectious pathogens by making the nations party to the Convention responsible for the destruction or diversion to peaceful purposes of the existing biological weapons and dispersal technology.[112] One of the problems with the rhetorical construction of the Convention in Article II is the term peaceful purposes due to the fact that the Soviet Union begins, at the same time of the agreement to this document, to create a civilian branch of its biological weapons program and to cloak its purposes under the auspices of civilian biomedical research and applications.

In the same way the SALT I treaty delineates the attempts of the global community, particularly the United States and the Soviet Union, to back away from the precipice of weapons proliferation. The SALT I treaty calls for the limitation of offensive arms, particularly land-based intercontinental ballistic missiles (ICBMs),

submarine-launched ballistic missiles (SLBMs), and modern ballistic missile submarines.[113] Again, the problem with the SALT treaty is the relative adherence to the stipulations of the agreement and both countries are guilty of continuing the massive proliferation of weapons technology, cloaked under military advancements updating old technological weapons systems, such as submarines, ICBMs, and other bombardment systems. The continued violation of the SALT treaty, along with the Biological and Toxin Weapons Convention, creates a lack of accountability, with a special stress on the Soviet Union, that would result in accidents, as well as continued question over the biological weapons program and its security in an increasingly fractious political landscape.

One of the most famous incidents of the breakdown of the Soviet Union's covert biological weapons program is the 1971 accident at Sverdlovsk, in which anthrax escaped the production facility and contaminated the air and soil of the surrounding area and causing public infection of civilians. The incident was one of the events that led to United States intelligence organizations, particularly the Central Intelligence Agency, to brief the Office of the President that a bioweapons program did exist within the borders of the Soviet Union. The Sverdlovsk incident highlights the role of Biopreparat, a covert entity in the Soviet Union, in the biological weapons race. Early on reports of an accident at the facility states that individuals "in West Germany reported that an explosion in a military facility in the southwest section of Sverdlovsk had released a cloud of deadly bacteria the previous April. It claimed that as many as a thousand people

had died."[114] United States officials paid close attention to these reports because it would be hard evidence that the Soviet Union had violated the 1972 Biological and Toxin Weapons Convention. According to Central Intelligence Agency reports at the time of the accident, United States officials knew that "the specific nature of the accident is unknown, however, and the alleged number of deaths has varied from 40 to 300. Local hearsay in the Soviet Union is known to be unreliable, but [redacted] of a quarantine imposed by the military in Sverdlovsk in mid-April tends to support the rumors of a disease-related outbreak."[115] While the Central Intelligence Agency could not confirm the rumors due to Soviet interference, information released after the fall of the Soviet Union highlights that the reports of an accidental release of anthrax did indeed occur at the Sverdlovsk facility, violating the Biological and Toxin Weapons Convention. Soviet reports later released after the fall of the Union highlights that:

> should there arise a question about the outbreak of anthrax in Sverdlovsk in 1979, it is recommended to 'confine ourselves to a statement that at the present time an investigation is underway of accusations prompted by the anthrax outbreak and put forward by the USA which claims the USSR violates the Convention,' also to 'keep in mind that indeed an accident took place at the facility of Scientific Research Institute (NII) of Microbiology of the USSR Defense Ministry in Sverdlovsk . . .'[116]

Alibek reveals that the Sverdlovsk accident stems from the only defense of civilian populations against the research at the installation, "the large filters clamped over exhaust pipes" and an overlooked defective air filter caused "a fine dust containing anthrax spores and chemical additives [to sweep] through the exhaust pipes into the night air."[117] There is no way to know the exact death toll from the Sverdlovsk, but "the Soviet Union later

claimed that 96 people were stricken with the disease and 66 died" and another report from a scientist working at the facility stated that "the death toll was 105."[118]

By the decade of the 1980s, the major scientific leaders of the Soviet Union were ensconced in the various covert projects across the nation and conducting research to further support more virulent and devastating pathogens for the biowarfare program. By 1984, Sergei Popov was at the forefront of Project Vector in the chemistry department attempting "to penetrate the secrets of the smallpox virus"[119] and his superior Lev Sandakhchiev wanted "to push the frontiers of genetic engineering in biological weapons."[120] One of the problems with Popov's research into increasing the lethality of smallpox through genetic engineering is the lack of progress on increasing the emission of toxins naturally produced by the virus. Overall, "they could emit a small amount, but if he tried to make them more productive, there was an unexpected side effect: the microbe became less poisonous. The virulence of the organism would decline, instead of increasing."[121] Popov's work finally heads in a direction, in which "he found a way to set off a biological trigger . . . to deceive the body's immune system. . . . [I]n this new concept, if the microbe is made to appear similar to the human body, the immune system would be triggered not only against the invader, but to attack the healthy person, to turn on itself."[122] Further research lent itself to a biological weapon that would use this biological trigger to attack the central nervous system and in its inception it was hypothesized that it would cause the infected "to suffer in two waves. The first might be smallpox. But then, perhaps after a period of recovery, the body would turn on its own

nervous system, and the victims would be paralyzed and die. The second wave would be unexpected; no vaccine could stop the process."[123]

Igor Domaradskij, on the other hand, was a preeminent research scientist on reengineering bacterial genetic material in order to create completely lethal and unstoppable pathogens. Domaradskij worked out of the Obolensk laboratory and "was searching for a way to make tularemia into an agent that would infect people while resisting both antibiotics and vaccines."[124] According to both Domaradskij and Alibek, the Soviet military wanted a pathogen that could resist a broad spectrum of antibiotics and "the only worthwhile genetically altered weapon, for military strategists, was one that could resist all possible treatments" and more specifically could "resist up to ten different antibiotics at once."[125] Domaradskij faced some of the same problems that Popov did in his research of tularemia because "if a bacterium acquired some new characteristic, it could lose others" and after "'having become resistant to several antibiotics, the strain lost its virulence, which was unacceptable to the military."[126] Even his theory of combining two less virulent strains of antibiotic resistant smallpox, highlighting the unrealistic expectations of the military for the Soviet ability to manufacture highly virulent incurable pathogens, especially given the lack of progress with scientific technology when compared to the United States and other Western countries.

The expansion of the Soviet Union's biological weapons program during the height of the Cold War highlights an increasingly technology driven closed society that became obsessed with the possibility of total war instigated by the United States. In

reaction to the paranoia of the Soviet military and political elite, the Soviet anti-plague system is inexorably linked to the militaristic offensive biological weapons program, with increasing pressure being placed on the idea of Soviet prosperity through Soviet scientific breakthroughs. Moreover, Soviet officials in charge of these programs were searching for a mythical lethal pathogen, resistant to all known antibiotics and a harbinger of the destruction of the United States. These lofty ideas about the future of the Soviet biological weapons program placed all of the Communist party apparatus' hopes in a chimaera that could not be supported by the technological advances of the period.

By the end of the 1980s, the Soviet biological weapons program had outstripped the progress of scientific technology within the closed society of the repressive regime. Moreover, these genetic and other bioengineering feats hypothesized by Soviet scientists would most likely not see a period of fruition due to the economic instability inherent in the period and a continuing preoccupation with the creation of a dead hand apparatus that would ensure massive retaliation in the face of a United States nuclear attack. Subsequent biological weapons research would be cloaked under the restructuring of the Russian government and economy, with the disconnection of civilian research facilities, such as Biopreparat, away from the military. One of the recurring problems with the legacy of the Soviet biological weapons program is the fact that much of the upper echelon in charge of these currently civilian facilities are populated by the old Soviet guard that were once considered the ruling military officials inherent in the history of the covert bioweapons drive.

CHAPTER V

LEGACY OF THE SOVIET BIOWEAPONS PROGRAM AND THE CURRENT GLOBAL SECURITY THREAT

After all of the strides made by the Soviet Union in the drive for scientific and military supremacy over the United States during the twentieth century, the increasingly high economic costs of the period could not support the rampant spending as the Soviet Union expanded its budget beyond the capacity of the costs. In the period after the collapse of the Soviet Union, the covert bioweapons program faces serious problems with a decade's worth of economic shortcomings on the part of securing the old Soviet installations, both those in the current geographical boundaries of Russia and those in the former Soviet satellite states. The current global security concern the status of these biological weapons, particularly in terms of the possessors of the pathogens responsible for some of the most lethal diseases in the world. The advent of global terrorism creates an added concern of these pathogens being utilized by non-state actors, particularly those individuals espousing the views of militant Islamic ideals. In the current political landscape, a concern with the relative security of these biological agents should be on the forefront of national security analysts and policy generators, particularly in the United States because of the country's status as a probable terror target.

By 1987, the collapse of the Soviet Union was well underway and the then General Secretary, Mikhail S. Gorbachev "approved a secret decree that ordered a gradual

scaling back of the Soviet BW program."[127] By the time of the installation of the new Yeltsin government, a complete rollback of the attitudes for the Soviet biological weapons program had occurred and Yeltsin:

> acknowledged that the Soviet BW program had continued for some 20 years in violation of the BWC and ordered it to be closed down. . . . Accordingly, over the next several years, the various Biopreparat facilities were dismantled or converted to peaceful research and pharmaceutical production; the massive BW agents production facility in Stepnogorsk (Kazakhstan) was demolished.[128]

Furthermore, Yelstin, in a televised speech in 1992, stated "that the Soviet Union had experienced a 'lag in implementing' the BWC" and in a meeting with President Bush in February 1992 at Camp David "he provided additional details regarding the Soviet program based on a report prepared at his direction by General Anatoly Kuntsevich . . . [who reported that] the Soviet military had illegally developed prototypes of aerial bombs and rocket warheads capable of carrying anthrax, tularemia, and Q fever."[129] One of the problems with Yeltsin's decree is the fact that the military institutes were not necessarily affected by the directive and, due to the relative secrecy of the Russian military, it is unknown what type of research these facilities are conducting and whether they are following the Biological Weapons Convention. Furthermore, under the Putin presidency, "representatives from the Russian Ministry of Foreign Affairs and [Ministry of Defense] have demonstrated a regrettable tendency to repudiate earlier admissions by Yeltsin and others that the USSR once possessed an offensive BW program."[130]

One of the reasons for Yeltsin's avowal of the covert Soviet bioweaopons program is the fact that in 1984, the United States felt that it had enough evidence to

make public allegations highlighting their suspicions of a continuing program for offensive weapons. The legacy of biological weapons contamination and accidents at Rebirth Island and Sverdlovsk provided the United States with enough proof to carry out a international relations tactic that would force Russia's hand in the aftermath of the dissolution of the Soviet Union. The new Russian government was in no position to attempt further collusion into the existence of its violation of the Biological and Toxin Weapons Convention due to the fact that the new government was still dealing with rampant debt and an increasingly fragile economy caused by the loss of the newly independent Soviet satellites.

Early on in the 1990s, the United States and Great Britain placed immense pressure on Boris Yeltsin for the recognition of the new Russian government, causing him to be far more open than what the new government was comfortable with. In 1992, the Trilateral Agreement on biological weapons was reached between the United States, Great Britain, and Russia, in which the document was supposed "to ensure that all such activities in the successor state, Russia, were verifiably ended."[131] The agreement was designed to reaffirm the three nations' "commitment to full compliance with the BWC" and "noted that Russia had ceased offensive BW research, dismantled weapon production lines, closed test facilities and dissolved the department in the Ministry for Defence that was responsible for the offensive BW programme." [132]The era of collusion actually continued under Yeltsin's administration because the joint visits to old biological weapons facilities did not yield the expected preponderance of evidence of an illegal

bioweapons program. The first visits occur in 1991 under President Gorbachev and the American and British teams visited four former Biopreparat facilities. According to the participants, they were met with "'denials, evasions, and large rooms that had been stripped of equipment and cleaned up'" as well as the fact that "'in every facility that had been opened for inspection . . . the Russians had established convincing cover stories that made it appear as if each site had been converted to research and manufacture of vaccines.'"[133] Subsequent inspections under the presidency of Boris Yeltsin resulted in vastly divergent results, with American and British scientists finding "'evidence that leads [them] to understand that there is still an offensive BW program underway. . . . Yeltsin's decrees have not filtered down to the working level'" and sites had "'specialized equipment at non-military sites that ought to be dismantled . . . [because they] demonstrated that a substantial infrastructure with no commercial purpose.'"[134] The trilateral agreement did not effectively answer the questions surrounding the Soviet biological weapons program because "the process did not allow investigation of all the facilities within Biopreparat which were (and remain) of concern, and did not extend to the military dimension of the programme, which still remains concealed."[135] Defecting Soviet scientists, such as Ken Alibek, added to the cascade of questions surrounding the Soviet-era biological weapons program and raise new questions of whether the program had been dismantled at all. Allegations continued into the latter part of the 1990s and compliance issues with the Biological and Toxin Weapons Convention are still a

predominant international relations issue between the United States and the Russian Federation.

The Biological and Toxin Weapons Convention, and the reliability and accuracy of the Russian documentation of their biological weapons program, becomes a major concern for the decade of the 1990s and in the 1996 edition of the United States Department of Defense's *Proliferation: Threat and Response* and the Arms Control and Disarmament Agency's compliance report to Congress of the same year, highlight a continuing threat with the Russian posture towards both the Convention and the trilateral agreements on biological weapons. The trilateral agreements were designed to resolve the American and British concerns of Russian Soviet-era arms proliferation, but in reality these agreements worsened the concerns of the United States.[136] These attitudes further creating a stigma on the newly democratic Russian state because the United States felt that "Russia may be retaining capability for the production of biological warfare agents."[137] Further concerns were raised with the Russian state's compliance with various treaties in 1997, due to an increasing interest in genetic engineering. According to scientific articles published during this period, Russian scientists "reported on their success in genetically engineering a strain of anthrax resistant to vaccine, thereby feeding press speculation about novel forms of Russian anthrax weapons."[138] Furthermore, allegations about the continuance of a Russian offensive biological weapons program are still present in the international landscape and according to most researchers:

> Russia is interested in maintaining its offensive biological potential because biological weapons have unique capabilities. Imagine the situation in a

> mountainous region like Chechnya or Afghanistan. It's very difficult to fight in the mountains using conventional weapons. But a single plane or cruise missile armed with biological weapons could kill absolutely everybody in any deep valley in the mountains. That's unfortunately a good application of biological warfare. So these weapons can be considered highly effective for certain types of low-intensity or high-intensity conflict.[139]

Furthermore, Yevgeni Tulykin, who was a former head at the Center for Military and Technical Problems of Anti-Bacteriological Defense (Compound 19) in Sverdlovsk, argued that "the facility was discretely being rebuilt and re-equipped with the aim of resuming offensive BW production."[140] The Soviet-era biological weapons program becomes the specter and threat from the Cold War era and the flagrant violation of treaties, such as the Geneva Protocol, the Biological and Toxin Weapons Convention, the SALT and START treaties, and trilateral agreements further complicates matters in connection to global security, particularly American national security. The United States is caught in a double-bind situation due to the question of the methods of enforcement. The interplay of competing international demands and specific policing methods are crucial to the success of any agreement on the nonproliferation and destruction of biological weapons and their affiliated programs, the drawback of these agreements is the evidence of "instances of noncompliance without penalty . . . and unpunished violations . . . [which have] become an accepted feature of arms control" wherein the "treaties' value as the embodiment of the international norms regarding acceptable and unacceptable international behavior [are] badly eroded, creating a more conducive environment for the further spread of these weapons."[141]

Further problems with the legacy of the Soviet biological weapons program is the state of the abandoned former military sites throughout the landscape of the former Soviet Union. Due to the lax environmental and security policies during and after the fall of the Soviet Union, problems with the former installations stem from the locations of the stockpiles of these bioagents and starter samples of bacteria and viruses, as well as the contaminated equipment and storage containers. In one instance, Rebirth Island, which is now a part of Kazakhstan and Uzbekistan:

> after the Russian authorities left . . . in 1992, local residents of [the two newly independent nations] flocked to the island to seize abandoned military equipment that the Russian forces had been unable to take with them. It is to be hoped that the looting occurred in a safer, residential part of the island.[142]

On top of the widespread looting at these abandoned facilities, "Kazakhstan has not yet used the portion of the island under its jurisdiction for economic purposes, and specialists remain concerned about environmental contamination."[143] Environmental contamination will continue to be a problem for the foreseeable future due to the sheer magnitude of the contamination that occurred during the duration of the Soviet biological weapons program. Overall, analysts highlight continuing problems with the former biological weapons facilities in Kazakhstan due to several different variables, including the lack of local resources and sources of monetary support in order to effectively converting the old Soviet facilities. The problems found within Rebirth Island and Sverdlovsk highlights the pervasive negative effects of both the covert Soviet biological weapons program instituted during the Cold War and the brutal collapse of the Soviet Union in 1992

because these two events makes it increasingly difficult for these disadvantaged countries to find equal footing within the global landscape.

Furthermore, the collapse of the Soviet Union caused the collapse of the Russian scientific community that was already endangered by the high defection rate of these individuals during the Cold War. The industry was particularly hard-hit after the dissolution of the Soviet Union because of the collapse of the economy and the fact that these scientists lost the relative stability found working for the Soviet military apparatus. Overall, "Russian science fell into a protracted crisis, with plummeting salaries, little funding for research, and few new recruits to science."[144] The fears after the fall of the Soviet Union was "that rogue nations and terrorist organizations would gain access to weapons of mass destruction (WMDs)" and "Russians with knowledge about nuclear, chemical, and biological weapons could now depart to any country of their choice, including rogue nations seeking to produce WMDs."[145] One of the problems with the state of the Russian scientific communities in recent years is the fact that Russian scientific grants were not an impetus for these scientists to remain in the country and not consider a move towards known rogue states. The fears were justified as rogue nations, such as Iran, actively travelled to the former Soviet Union in order to secure these scientists as visiting professors at their native universities and consultants for the nuclear, chemical, and biological weapons programs. In particular, The pressing problem during this period was the proliferation of biological and chemical weapons programs,

particularly in the Middle East, due to continuing armed conflict among these nations and due to their status as aggressor nations towards Israel.

According to the Russian scientists interviewed in 2004, a pool of 602 physicists, biologists, and chemists, "the threat of WMD brain drain from Russia should still be at the forefront of our attention" and "roughly 20 percent of [these scientists] say they would consider working in rogue nations such as North Korea, Iran, Syria, and Iraq (still considered a rogue state at the time of the survey."[146]

According to many of the scientists active in the latter part of the Cold War, particularly Lev Sandakhchiev, "Iranians had come to Vector, hunting for technology and know-how" and others noted that "'they talk about pharmaceuticals, . . . it's clear their interest is in dual use equipment that can be used for biological weapons."[147] For the most part, United States intelligence points to the biological weapons programs of Iraq and Syria as the major benefactors of the Soviet bioweapons program, both during and after the Cold War. Iraq is a prime example of the movement of biological agents and technology into an aggressor nation due to the fact that, in 1997, inspectors from the United Nations Special Commission on Iraq (UNSCOM) found documents narrating the "lengthy negotiations with an official Russian delegation that culminated in July 1995, in a deal worth millions of dollars, in the sale of a 5,000-liter fermentation vessel"[148] and further investigations into the Iraqi biological weapons program would find evidence of the same type of fermentation technology at a single-cell protein plant in Al Hakam "for large-scale production of two BW agents, anthrax and botulinum toxin."[149] The loss of

Soviet-era biological weapons scientists to aggressive nations, such as Iran, is troubling due to the instability of the region of the Middle East and the long history of state-sponsored terrorism. The added layer of conflict resides in the fact that the Middle East is not only populated with the presence of state-sponsored terrorism, but also houses some of the most violent and unpredictable groups of jihadists and other non-state actors, such as al-Qaeda, al-Qaeda Arabian Peninsula, Haqqani Network, Hezbollah, and the al-Aqsa Martyrs' Brigade.

One of the major problems with any attempt to regulate the former biological weapons installations is the sheer number of facilities, under Biopreparat alone there are about fifty pharmaceutical companies that were devoted to creating both defensive and offensive weapons. The key installations that are concerning for American national security are "the military microbiology facilities at Kirov, Yekaterinburg, Sergiev Posad, and Strizhi [that] remain shrouded in secrecy and off-limits to Western visitors" and overall United States officials believe "that some biological production facilities in Russia, 'in addition to being engaged in legitimate activity, may be maintaining the capability to produce BW agents.'"[150] Not only is the geography of the Russian Federation dotted with these installations, but "a number of facilities formerly involved in Soviet CBW programs are located in . . . independent states (NIS) of the FSU."[151] Installations retain massive amounts of biological material, for example the Vector center in Koltsovo retains "more than 15,000 viral strains including the deadly smallpox, Marburg, and Ebola viruses."[152] The security at these remaining facilities are also a

concern in the increasingly unstable geopolitical landscape due to the fact that "existing physical security measures — gates, guards, and guns — are mostly directed against outsider threats, with little emphasis on discouraging the more likely insider threat."[153] These issues are further strengthened by the intelligence reports supporting the lack of security for biological agents and the relative ease with which Middle Eastern countries obtained key technology from the Russian Federation. Both Iraq and North Korea obtained samples of smallpox smuggled from Russia in the 1980s and 1990s,[154] during the 1992 Georgia civil war armed personnel gained access to plague and cholera from the Institute of Experimental Pathology,[155] and in 1995 plague, cholera, and anthrax collections were stolen from a "Kazakh anti-plague institute with the intent to use them in a terrorist attack on the city of Khabarovsk."[156] Finally, direct evidence of the desire for biological weapons of mass destruction because in the 1999 Egyptian trial of al-Jihad, an associated terror cell of Osama bin Laden, the defendants "stated that the group had purchased ingredients for CBW agents from former Soviet bloc countries with the intent to produce and employ such agents for terrorist attacks against US and Israeli targets."[157] Treaties, such as the Nunn-Lugar Cooperative Threat Reduction, have narrowly focused on the nonproliferation and destruction of nuclear fissile materials and its correlated equipment, but has slowly expanded to include both chemical and biological weapons. One of the problems that continue to plague the international landscape in terms of multiple programs operating under standing threat reduction treaties is the relative lack of consistency and the increasing global security threats from the rapid generation of Islamic

terrorism and other non-state actors securing the means to produce either large scale biological weapons production or utilizing pathogenic agents in order to carry out terrorist attacks for a variety of purposes.

The proliferation of the Soviet biological weapons program may be grounded in the historical actions and events of the Cold War, but the threat of these pathogens is still a contentious issue within the construction of American national security studies and the threat of bioterrorism a problematic arena according to American preparedness analysts. Overall, the Soviet bioweapons program is considered a viable threat to United States national security, due to the lack of "complete knowledge of the biological weapons capabilities" and "may not have vaccines or antibiotics that could provide a defense against infection."[158] Counterterrorism responses have been updated due to the increased threat of biological terrorist attacks, but for the most part "public health officials stress that U.S. preparedness for a biological attack is still inadequate."[159] The increased focus on biological weapons as terrorist mechanism of attack highlights a disparity in the terrorism response that was created after 11 September 2001 and most governmental analysis reports list several reasons why biological agents are attractive to Islamic terrorist cells and other third party organizations, namely that "they can produce mass casualties and incite panic; it could be difficult to trace the perpetrator of a biological attack; and they could provide an 'asymmetric means' of challenging 'America's overwhelming conventional and nuclear war-fighting strength.'"[160] Further complicating matters is the American subsidization of foreign nations' scientific programs, which

creates a problem with the identifying problematic areas in which "if the United States helps fund non-military research using biological technologies, it might risk unintentionally subsidizing a BW program"[161] because most biological weapons research crosses over with legitimate medical research and technology.

Overall, there are three types of groups that would utilize bioweapons in terrorist plots of various types, namely: (1) "large organizations that are well-funded and possibly state-supported[,]" (2) "smaller, less sophisticated organizations may or may not have the intent to kill but may use biological pathogens to further their specific goals[,]" and (3) "smaller groups or individuals who may have very limited targets (e.g., individuals or buildings) and are using biological pathogens in murder plots or to threaten havoc."[162] In recent studies on confirmed use of biological agents, conducted by the National Defense University, "of the 100 incidents, 29 involved agent acquisition, and of the 29, 19 involved the actual nongovernmental use of an agent, and most were used for biocrimes, rather than for bioterrorism."[163] The analysis conducted by this study, as well as others, highlights "that biological pathogens have been used for biological warfare and terrorism, and their potential for future use is a major concern . . . therefore [the United States] must be prepared to respond appropriately if they are used again."[164] The growing concern stems from the increasingly violent attacks by subnational groups and the fact that religious conviction is involved in most of these groups' aims and end goals. On the whole, "there has been a sharp increase in militant religious groups internationally as a percentage of all terrorist groups" and "militant religious terrorists, experts note, may

label their victims as heretics or infidels and thus unfit to live. The incentives for such groups to kill large numbers of people may thus be unconstrained by the scruples of earthly constituencies."[165] On top of the increasingly militant rhetoric and belief system, the global landscape is witnessing an "increasing availability of information and resources for the building of weapons by subnational groups that in former years had been feasible only with the resources of a state" and the groups expressing interest in such weapons include: al-Qaeda, Palestinian Liberation Front, Red Army Faction, Hezbollah, Kurdistan Workers' Party, German neo-nazis, and Chechen militants.[166] The explosion of subnational groups is also transcending capitalizing on the "commonality of interests between populations" and achieving support due in part to "American global policies and cultural as well as political global reach, groups are developing ties across formerly divisive ideological, ethnic, and national lines."[167] Biological weapons use by terrorist groups would also fall in line with their utilization of suicide bombers because of the inherent religious ideology of dying for the cause. The threat of terrorists' use of biological weapons is a growing concern since 11 September 2001 and the United States' preparedness for such an event, as seen in other areas of response preparedness, is extremely lacking. The general inability to retain viable foreign policy linkages within Middle Eastern nations, such as Afghanistan and Iraq, compounds the problem of accurate intelligence on the possibility of biosecurity concerns in this region of the world. Without accurate intelligence and organizations that will police this area of

nonproliferation, the United States' national security policy is hampered to the point of complete paralysis.

CHAPTER VI

CONCLUSION

The biological weapons program of the Soviet Union has long-term and long-reaching impacts on the current United States national security landscape and the continuance of effective foreign policy. As seen with the brain drain after the collapse of the Soviet Union in the early 1990s, the scientific research and expertise of the Soviet biological weapons program came under increasing pressure from rogue states, especially Iran, Iraq, and Syria, and continues to be a problematic area of the scientific community in the current global landscape. The threats of bioterrorism and biocrime are found on a double front, both from non-state actors, and affiliated rogue states, but also from the Russian Federation. One of the continuing security concerns with the Russian Federation is the stiffening of diplomatic ties and foreign policy towards the United States, a trajectory that has been ongoing since the first presidency of Vladimir Putin. The Russian Federation is increasingly exerting its power in Eastern Europe, particularly with its decision to interfere in the Ukrainian Revolution and particularly with Crimea. The territorial aims of the Russian Federation under Vladimir Putin further strains American foreign policy and national security because of possible unforeseen ramifications of the addition of Crimea to Russia.

The American preparation for a possible biological weapons attack includes the preparation of the public in response to an attack, particularly psychologically, and a

reevaluation of the domestic and foreign policy with regards to this threat. The United States government must evolve its strategy because "it is a difficult technical challenge in the age of globalization, when the expertise and means to carry out attacks are becoming much harder to control through traditional state measures like border controls, export controls, treaties and sanctions."[168] The treaties, such as the Trilateral Agreement and the Biological and Toxin Weapons Convention, are found to be increasingly inefficient in dealing with the ramifications of the Cold War biological arms race during the Cold War, particularly with the massive covert operations of the Soviet Union. Russia is continually refusing to acknowledge the existence of a biological weapons program under the Soviet Union during the Cold War and subtle rhetoric found in several Russian publications hint that "the Russian law securing the conformance to the BTWC is not being followed."[169]

One way of dealing with the problems of Russian and other countries usage or continuing research into offensive and defensive biological weapons program is targeting the current ruling organizations in charge of providing support in monitoring the climate of biological pathogens production. Overall, "it's suspected that more than a dozen sovereign nations possess some form of offensive bioweapons program, assuming one includes some republics of the former Soviet Union[,]" therefore making it necessary to reevaluate the efficacy of the Biological and Toxin Weapons Convention. A crucial way to make the Convention stronger is "to muster international resources to enhance and strengthen the provisions of the BWC — giving it some 'teeth.'"[170] By giving the Convention 'teeth,' a reorganization of the Convention would include "verification

measures that monitor treaty compliance, including reciprocal inspection visits to suspected bioweapons facilities."[171] Without an overarching Biological and Toxin Weapons Convention that can effectively monitor the status of biological weapons programs in the global landscape, and by extension, punish the member nations who are violating the agreement, the ability to respond to the unstable geopolitical ramifications of biological weapons is destabilized and rendered completely inefficient.

Further complications that need to be addressed by American foreign policy include both the status of Russia's position to its former biological weapons program and any attempt to firmly resurrect these research pursuits. One of the problems with accurately predicting the trajectory of Russian politics and military pursuits is the lack of transparency found under the administration of Vladimir Putin and the stiffening of international relations between the Russian Federation and the United States. Furthermore, the status of terrorist groups and other non-state actors is a continuing concern, due to the ability of producing a large amount of lethal pathogens at an extremely low expense. While it is arguable that terrorist groups, such as al Qaeda, or even Chechen Islamic groups, would be able to utilize these types of weapons, the existence of programs within Soviet satellites and facilities found within the Middle East are a concern to American national security. The increasing destabilization of the Middle East, and now Eastern Europe, makes the history of the Soviet biological weapons program a serious concern for the geopolitical landscape and an area in which the United States should remain vigilant for the possibility of a resurrection of active programs throughout the world.

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[75] Ibid.
[76] Ibid, 41.
[77] Ibid.
[78] Judith Miller, Stephen Engelberg, and William Broad, *Germs*, 48.
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[82] Ibid.
[83] Ibid.
[84] Judith Miller, Stephen Engelberg, and William Broad, *Germs*, 51.
[85] Ibid.
[86] Ibid., 52.
[87] Ibid., 53.
[88] Ken Alibek, Biohazard, 18.
[89] Sonia Ben Ouagrham-Gormley, "Growth of the Anti-Plague System during the Soviet Period," 41-42.
[90] Ibid., 42.
[91] Ibid., 41.
[92] Ibid., 18.
[93] Ibid.
[94] Ibid., 19.
[95] The date of the creation of the Biopreparat apparatus is not clearly delineated and most sources attribute its date of inception to be around the year of 1973, most noting a approximate dating of post-1973, especially by I.V. Domaradskij, a high-ranking Soviet biological weapons researcher and scientific director of the Obolensk State Research Center of Applied Microbiology (Project Bonfire). I.V. Domaradskij and W. Oren, "Achievements of the Soviet Biological Weapons Programme and Implications for the

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[96] Ibid.
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