WHAT THE COVID-19 PANDEMIC REMINDS US: REVALUATION OF THE SOVIET AND RUSSIAN BIOLOGICAL WEAPONS PROGRAM*

COVID-19 Pandemisinin Bizlere Anımsattıkları: Sovyet ve Rus Biyolojik Silah Programının Yeniden Değerlendirilmesi

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Abstract

Throughout the history there are several examples in which biological agents have been used as weapons against humans and animals. Despite signing the Biological and Toxic Weapons Convention (BTWC) of 1972 that banned research, use, and production of BW, the Soviet Union continued to BW program that is currently uncertain whether Russia has continued during the post-Cold War era or not. This paper uses Western and Russian sources to describe the Soviet Union's BW program and underlines our contention that BW continue to constitute a possible threat, as reminded by COVID-19.

Keywords: *COVID-19, Biological Weapons, Biological Agents, Soviet Union, Biopreparat.*

Öz

Tarihte, biyolojik ajanların insanlar ve hayvanlara karşı silah olarak kullanıldığı pek çok örneğe rastlanır. Sovyetler Birliği 1972'de biyolojik silahların araştırılmasını, kullanılmasını ve üretimini yasaklayan Biyolojik Silahlar Konvansiyonu'nu imzalamasına karşın, bugün bile Soğuk Savaş sonrası Rusya'sında hala devam edip etmediği tartışma konusu olan BS programına devam etmiştir. Bu çalışma, Batılı ve Rus kaynaklar aracılığıyla Sovyetler Birliği tarafından yürütülen BS programına odaklanmıştır. Çalışma, temel olarak, COVID-19'un da anımsattığı üzere, biyolojik silahların olası bir tehdit olmaya devam ettiği görüşüne dayanmaktadır.

Anahtar Kelimeler: *COVID-19, Biyolojik Silahlar, Biyolojik Ajanlar, Sovyetler Birliği, Biopreparat.*

* **Received on:** *22.10.2021* **Accepted on:** *07.12.2021*

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INTRODUCTION

Since its emergence in China in December 2020, COVID-19, also known as the coronavirus, has generated a pandemic that has affected the whole world economically, socially, psychologically, and politically. Many people, including high-level officials, believe that the world will fundamentally change as a result of this pandemic, and the international system based on the globalization will radically change. Indecision of some international alliances such as the EU, which failed to show solidarity during the crisis, also has been feared or predicted by many.

The pandemic also reminds us about historic plagues, epidemics that resulted in massive death toll, and especially makes us rethink on possible results of bioterrorism. Some conspiracy theorists, most of which are highly unreliable figures, also argued that Covid-19 is a biological weapon (BW) deliberately created by government(s). However, they do not mention a specific sponsor because states that once had BW capabilities, such as the US, Russia, and the UK, have been among the states most affected by the pandemic.

Pandemics have also reminded the potential impact and possible threat may be presented by the new generations of BW, including genetically modified agents, an issue that the international community removed from its agenda after the early post-Cold War era. However, it is well known that states that conducted intense BW programs in the past still possess the knowledge and infrastructure needed to resurrect them. International efforts to curb the production, possession, and use of BW have lessened this threat, but recent events such as the increased armament that followed the scrapping of the Ant-Ballistic Missile (ABM) Treaty and Intermediate Nuclear Forces (INF) Treaty between Russia and the US increased concerns about returning to a Cold War-era style arms race. Abolishing the Biological and Toxin Weapons Treaty (BTWC) of 1972 may sound almost impossible now, but increased tension between states,

especially the US and China, generated by the outbreak of the pandemic may cause people to question the effectiveness of this treaty.

By analyzing the Cold War era BW program of the former Soviet Union, this paper analyses both Western and Russian sources and seeks to determine what both sides had common as well as their differences. We heartily believe that BW constitute a massive threat on humankind, whether pursued by states or terrorist organizations.

BIOLOGICAL WEAPONS IN THE PAST

Although use of the biological and chemical agents as weapons dates back to ancient times, WMDs have long been a big fear of human beings, particularly in the twentieth century with the advent of the NW that killed hundreds of thousands of people in Hiroshima and Nagasaki. Then, NW overshadowed Chemical Weapons (CW) and BW and have become the main deterrent factor behind the hash policies of the Cold War years. Nevertheless, the use of herbicides and chemical agents by the US in Vietnam, by Saddam Hussein's forces against Iran during the war and then against Kurdish population in Halabja in 1988 and finally by the Assad's regime forces against its own population from 2013 to about 2019 underlined the threat they present.

As already seen during the Japanese Invasion of China from 1939 to 1943, BW have great potential for deaths of thousands of people in the past and still pose a big threat against humanity, as COVID-19 pandemic reminds us. BW are described as "living organisms, whatever their nature, or infective material derived from them, which are intended to cause disease or death in man, animals or plants, and which depend for their effects on their ability to multiply in the person, animal or plant attacked"[1] or as "microbial or other biological agents, or toxins whatever their

1 Edwards M. Spiers, *Chemical and Biological Weapons: A Study of Proliferation,* New York-S. Martin 1994, p. 2.

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."[2]

Bacteria, viruses, and toxins are commonly regarded as BW. However, scientists and scholars also regarded fungus[3] and rickettsia[4] as potentially being transformed into BW. Due to their dual use, or the ability of these organisms to achieve peaceful goals in medicine or pharmaceuticals as well as destructive ones as BW, classifying and categorizing BW has been a complex task. Additionally, developments in microbiology, genetic engineering, and biotechnology may change the list of the biological agents in the near future.

History shows that biological agents have frequently been used as weapon since ancient times. In 600 B.C., Assyrians poisoned enemies' wells with a fungus called rye ergot in what is generally regarded as the first use of biological agents as a weapon in history. Persians, Greeks, and Romans used to throw corpses into the wells of their enemies to poison their water.[5] Corpses contaminated with plague were catapulted over the walls into Kaffa (in Crimea) by Mongols, forcing besieged Genoons to flee in 1346-1347.[6]

2 "Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction", *Disarmenent,* http://disarmament.un.org/treaties/t/bwc/text, (Date of Accession: 07.05.2020).

3 Steven M. Block, "Living Nightmares: Biological Threats enabled by Molecular Biology", *The New Terror: Facing the Threat of Biological and Chemical Weapons,* Sidney D. Drell et al, eds., Hoover Institution Press, Stanford 1999, p. 44.

4 Wendy Barnaby, *The Plague Makers: The Secret World of Biological Warfare,* The Bath Press, London 1999, p. 19.

5 Barnaby, *op. cit.,* p. 6.

6 Center for Nonproliferation Studies, "Chronology of State Use and Biological and Chemical Weapons Control", *Monterey Institute of International Studies,* http://cns.miis.edu/research/cbw/pastuse.htm, (Date of Accession: 11.04.2020).

History also tells us of massive death from plagues and epidemics. The plague known as the Black Death, for example, covered Eurasia and Middle East between 1300 and 1600, resulting in the death of upwards of 75% of Europe's population[7]. The plague that erupted in China in 1894 and reached India in 1898 killed 13 million people in 15 years[8].

Despite these tragedies, attempts to research, produce, and stockpile large amounts of BW have been still a big threat against humanity. BW are regarded as attractive weapons because of their inherent features—they are lethal, easy to carry and hide, hard to detect, and have an incubation period that makes them hard to trace. As we have witnessed during the COVID-19 pandemic, any attack through BW may have major psychological effects on people and are very easy to disseminate, which allows for person-to-person transmission and global spread, especially in a time of extensive international travel.

In 1910 Germany became the first state to start a BW program that capitalized on improvements in medical science, and it also became the first state to use biological agents on the battlefield. German troops used glanders, a contagious zoonotic infectious disease, to kill enemy horses during the war.[9] Germans also hoped to undermine its adversaries by infecting livestock and animal feed in neutral states that shipped goods to Germany's enemies.[10] Despite these efforts, BW did not play an important role during WWI and there has not been any important case relating to the use of BW in the battlefields of Europe.

7 American Scientific, *Understanding Germ Warfare,* Warner Books, New York 2002, p. 3.

8 Michael T. Osterholm-John Schartz, *Living Terrors: What America Needs to Know to Survive the Coming Bioterrorist Catastrophe,* Delta, New York 2000, p. 5.

9 Herbert M. Levine, *Chemical and Biological Weapons in Our Times,* Franklin Watts, New York 2002, p. 47.

10 David A. Koplow, *Smallpox: The Fight to Eradicate a Global Scourge,* University of California Press, Berkeley 2003, p. 64.

However, documents captured during the WWII revealed that Germany pursued BW programs directed by Himmler who favored BW, was later convinced that they were ineffective.[11] Except in local cases such as the pollution of reservoirs with biological agents in northern Bohemia and the dropping of bombs containing Colorado beetles into potato crops in southern England, there were no reports of the use of BW by Germans during the WWII. These weapons had no impact on the outcome of the war.[12]

Japan pursued one of the biggest BW programs in history and this program, which included systematic trials on humans in China during the Invasion, resulted in a large number of human casualties. Japan's BW program started in Tokyo in 1932 and was led by microbiologist Dr. Ishii Shiro, who established Japan's first BW facility in Harbin, Manchuria in that same year. The Japanese also used biological agents during the war, especially against Russian soldiers.[13] Japan's BW program and trial continued until it surrendered to the Americans. The exact number of casualties Japanese BW trials caused is not clear but estimates run from 10,000 to 1 million.[14]

The UK began studying the possibilities of biological warfare in 1937 out of fear that Germany had intensified its BW program. The program was originally designed for defense, but on January 2, 1942, the British government decided to acquire the ability to retaliate in kind against a

11 Ed Regis, *The Biology of Doom: The History of America's Secret Germ Warfare Project,* Henry Holt and Company, New York 1999, p. 76.

12 George Christopher et. al, "Biological Warfare: A Historical Perspective", *Biological Weapons: Limiting the Threat,* Joshua Lederberg, ed., *The MTI Press,* Cambridge 2001, p. 21.

13 Tom Mangold-Jeff Goldberg, Plague Wars: *The Terrifying Reality of Biological Warfare,* St. Martin's Press, New York 1999, p. 21.

14 See Sheldon Harris, Factories of Death: Japanese Biological Warfare, 1932-1945 and the American Cover-up, Routledge, New York 1994, p. 65; Daniel Barenblatt, *A Plague upon Humanity: The Secret Genocide of Axis Japan's Germ Warfare Operation,* Harpercollins, New York 2004, p. 97.

biological attack.[15] At Porton Down in Wiltshire, a team of scientists led by bacteriologist Paul Filder launched a top-secret research program on retaliation that could be deployed at short notice if Britain was subjected to a germ warfare attack.[16] These BW activities were intensified later in the war and Britain shifted its focus from defense to offense in 1944. This activities, only as R&D, have been continued until the mid-1950's.

The British began to question role of CW and BW when they began to suffer from economic problems caused by the Korean War and other overseas commitments. Britain's first nuclear test in 1952 and then acquisition of a bomber delivery system in the mid-1950s led the country to conclude that CW and BW were poor candidates for deterrence and should be replaced with nuclear weapons.[17] The UK started to shift its BW activities to civilian purposes and became the main supporter of the BTWC proposal. In 1975, Britain declared that it did not have BW and ended its BW research activities.

The US started BW activities in 1942 after intelligence agencies warned that Tokyo and Berlin possessed BW.[18] During and especially after the war the US intensified BW activities when policy reviews conducted by the US Department of Defense in the late 1940's and 1950's reached substantially the same conclusion: that the US was unprepared to meet any BW threat and therefore had to expand its own offensive weapons program.

15 Barend ter Haar, "The Future of BW", The Washington Papers, T*he Center for Strategic and International Studies*, Washington D.C. 1991, p. 4.

16 Brian Balmer, *Britain and Biological Warfare: Expert Advice and Science Policy 1930-1965,* Palgrave, London 2001, p. 11.

17 Susan Wright, "Geopolitical Origins", *Biological Warfare and Disarmament,* Susan Wright, ed., Rowman&Littlefield, New York 2002, p. 322.

18 Judith Miller et al., *Germs: Biological Weapons and Americas Secret War,* Touchstone, New York 2002, p. 38.

This expansion brought the US stockpile of poison gas to 42,000 tons; stimulated military interest in developing novel binary nerve-gas weapons in the following decades; led to stockpiling of at least ten different biological and toxin weapons; and generated a huge R&D establishment.[19]

Despite some programs by the US and the Soviet Union, biological and chemical weapons were seen as secondary problem for a long period. The issue became part of the international agenda in 1966 when Hungary condemned the US because of reports that it had used CW in Vietnam.[20] Actually, biological weapons were under discussion in Geneva at the Eighteen Nation Disarmament Committee (ENDC) from 1960 onwards.

The US unilaterally renounced its offensive BW program in 1969 and it destroyed its stockpile by the end of 1971. This made it possible for all parties to agree to The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (BTWC) that was signed in London, Washington, and Moscow on April 10, 1972. This convention took effect on March 26, 1975 with ratification by twenty-two states, and called for all BW to be destroyed within nine months.

During the post-Cold War era, nonproliferation of the WMD became one of the top security issues discussed by officials and scholars. In cooperation with Russia, the US invested an especially large amounts of resources into curbing this threat and adopted the Cooperative Threat Reduction Program to prevent terrorist organizations and rogue states from acquiring WMD from former Soviet Union states.

19 Wright, *op.cit.,* p. 315.
20 Ter Haar, *op. cit.,* p. 8.

Nonetheless, letters containing anthrax that were sent to officials, corporations, and journals in the US right after the September 11, 2001 terrorists attacks increased the fear of bioterrorism.[21]

Western states also expressed concern about the danger of rogue states with BW and CW. With these fears in mind, the US and UK invaded Iraq and toppled Saddam Hussein by accusing him producing such weapons. In following years, the BW threat became relatively unpopular from the international agenda until the emergence of COVID-19 in 2020 by which concerns on BW threats has been revived.

RUSSIAN BW PROGRAM IN THE WESTERN SOURCES

There have been conflicting reports about the beginnings of the Soviet Union's BW program. According to intelligence reports found in a German warship captured by the Allies, the Soviet Union launched a BW program in 1930s.[22] However, Ken Alibek, who became one of the main sources in the West for the Soviet Union's clandestine BW program, alleges that in the aftermath of a typhus outbreak in the Red Army from 1918-1921, Soviet military leaders secretly ordered studies in late 1928 on how typhus might be used as a weapon against enemies.[23] Croddy emphasizes that this typhus epidemic affected 30 million people and killed three million between 1918 and 1922. These statistics convinced Soviet leaders that, properly harnessed and designed, BW could have a devastating effect on their enemies.

21 Barry R. Schneider, "Bio-Defense Readiness; Thoughts after September 11th", *The Gathering Biological Warfare Storm,* Barry Schneider-Jim Davis, eds., USAF Counterproliferation Center, Alabama 2002, p. 1.

22 Robert Harris-Jeremy Paxman, *A Higher Form of Killing: The Secret History of Chemical and Biological Warfare,* Random House, New York 2002, p. 83.

23 Ken Alibek-Stephen Handelman, *Biohazard: The Chilling Story of the Largest Covert Biological Weapons Program in the World,* Random House, New York 1999, p. 33.

As a result, the first Soviet Bacteriological Institute was established by Lenin in Saratov in 1918.[24]

Kuhn and Leitenberg argue that initial work on BW began as early as 1918 at a proving ground in Kuzminki, where the People's Commissariat of Health initiated tests with anti-livestock agents.[25] The program for CW was started earlier than BW because of fatal results of German attacks with CW during the WWI.[26]

Rimmington argues that in December 1918, in what appears to be direct response to German BW sabotage efforts during the WWI, the Revolutionary Military Council issued Order:342, which established, under the Main Military Medical Administration, a Provisional Scientific Committee focused on preventative measures against infection of the human population against glanders.[27]

However, establishment of Military Chemical Agency in 1925 became the cornerstone of a systematic BW program. Yakov Moiseevich Fishman, the first head of the agency, established the first Soviet military BW laboratory, directed by Dr. A.N. Ginsburg, in 1926. Work here started in 1928 and focused on increasing the virulence and stability of anthrax.[28] Leitenberg and Zilinskas also report that 1928 marked the official commencement of a Soviet offensive BW program as a result of secret degree by the Revolutionary Military Committee.[29] Fishman promoted a defensive BW program able to respond to a possible attack against the

24 Eric Croddy, *Chemical and Biological Warfare: A Comprehensive Survey for the Concerned Citizen*, Springer, New York 2002, p. 233.
25 Jens H. Kuhn-Milton Leitenberg, "The Soviet Biological Weapons Program", *Biological Threats in the 21st Century: The Politics, People,* Filippa Lentsoz, ed., *Science and Historical Roots,* Imperial College Press, London 2016, p. 81.
26 Milton Leitenberg et al., *The Soviet Biological Weapons Program: A History,* Harward University Press, London 2012, p. 18.
27 Anthony Rimmington, *Stalin's Secret Weapon: The Origins of Soviet Biological Warfare,* Oxford University Press, New York 2018, p. 19.
28 Rimmington, *op.cit,* p. 23.
29 Leitenberg et al., *op. cit.,* p. 21.

Soviet Union and played an important role in the enlargement of the Soviet program in later years.

A secret Biological Institute was founded in 1930's in Suzdal, where research was conducted on tularemia and plague bacteria as BW agents, along with rickettsia and Q-Fever.[30]

The Soviet BW program was pursued by both military and civilian agencies based on a 1928 decree. The Military Chemical Agency, which was controlled by the Soviet's People's Commissariat of Defense (which later became the Ministry of Defense (MOD), was designated as the lead agency for managing both offensive and defensive BW programs. A civilian agency, the People's Health Commissariat (which later became Ministry of Health), which operated a biomedical research network consisting of at least 35 institutions working in disciplines such as epidemiology, genetics, immunology, and virology, was ordered to coordinate and execute military requests related to the BW.[31]

The Soviets increased their activities and produced BW before WWII. Military scientists at the Leningrad Military Academy, for example, acquired typhus agents in powder in 1930 that could be used as a weapon.[32] General Voroshilov, Soviet Minister of Defense, admitted in February 1938 that "if our enemies use such methods against us, I tell you that we are prepared—fully prepared—to use them also and to use them against aggressors on their own soil".[33] While Voroshilov meant attacks using gas, his statement could easily be read as preparation for retaliation with same weapon against not only CW but also BW.

30 Croddy, *op.cit.,* p. 233.

31 Raymond A Zilinskas, "The Anti-Plague System and the Soviet Biological Warfare Program", *Critical Reviews in Microbiology,* 34, 2006, p. 49.

32 Alibek-Handelman, *op. cit.,* p. 35.

33 Walter Duranty, "Soviet Threatens to Use Gas in War", *The New York Times,* 23 February 1938.

Another turning point for the Soviet BW program came with the capture and transfer to Russia at the end of WWII of Japanese scientists and materials from a BW research facility in Manchuria known as Unit 731. Stalin ordered Lavrenty Beria, KGB chief and who was charged with conducting Soviet BW program during WWII, to start a BW program similar to but bigger than the Japanese program. Thus, the Soviets established a BW research facility in 1946 in Sverdlovsk.[34] In practice, the Main Military Medical Directorate of the Red Army, headed by General Yefim Smirnov, was viewed as the main planner and advocate for the Soviet BW program and had the responsibility for its day-to-day operations.[35]

In the 1960s, after acquiring massive nuclear capabilities and long-range missiles, Soviet officials and scientists started questioning the effectiveness of BW on the battlefield. However, as General Smirnov emphasized, Soviet leaders decided to continue with the BW program after concluding that stopping it might endanger the security of the country.[36] Thus, the BW program that was decisively continued during 1960's, was accelerated in 1970s. Yuri Ovchinnikov, Vice President of the Soviet Academy of Science, played an important role in the decision to continue the BW program. In their memorandum to the Politburo, Ovchinnikov and his colleagues proposed to expand the offensive BW program into research facilities that would appear to be civilian as a way to evade Western intelligence services.[37]

Despite signing the BTWC in 1972, Brejnev issued a secret order that started a BW research program to increase the effectiveness of exiting biological agents, use genetic engineering, and create novel bacterial and viral strains resistant to the antibiotics and existing vaccines. These BW

34 Alibek-Handelman, *op.cit.,* p. 37.
35 Leitenberg et al., *op.cit.,* p. 26.
36 Igor V. Domaradsky-Wendy Orent, *Biowarrior: Inside the Soviet/Russian Biological War Machine*, Prometheus Books, New York 2003, p. 135.
37 Kuhn-Leitenberg, *op.cit.,* p. 87.

would be used on intercontinental missiles.[38] A Soviet second-generation BW program was simultaneously undertaken by both military and civilian agencies. Soviet officials designated the 15th Main Directorate of the MOD, headed by Smirnov, as the lead agency for all biological offense and defense work. Parallel to the BW program carried out directly by the MOD, a second top-secret BW program was established under the civilian cover of a vast pharmaceutical research and production complex known as Biopreparat.[39] The Biopreparat employed thousands of scientists and workers and focused on using genetic engineering to develop agents resistant to antibiotics.[40]

During the Cold War, the Soviet Union deployed BW capabilities and weapons, all of which were ready to use. In addition to 11 other BW agents, Soviet scientists especially focused on the smallpox virus, which historically caused the death of thousands of Russians, and aimed to have smallpox viruses ready to use in enormous quantities at any time. In mid-1970, the Soviet Chief of General Staff ordered an increase in BW stocks to 20 tons of smallpox viruses annually that were ready for use anytime.[41] Thousands of kilograms of smallpox were produced in liquid form and intended for delivery in cantaloupe-sized submunitions that were to be carried by the SS-18 intercontinental ballistic missile.[42]

There are reports that Institute of Molecular Biology VEKTOR (also known as Unit 15) in Koltsovo, Siberia held tons of stock ready to be used in a very short time.[43] The Stepnogorsk Scientific Experimental Industrial Base in Kazakhstan was able to produce 300 metric tons of weaponised bacillus anthrax per ten-month production cycle.[44]

38 Alibek-Handelman, *op.cit.,* p. 41.
39 Zilinskas, *op.cit.,* p. 49.
40 Malcolm Dando, *The New Biological Weapons Threat, Proliferation and Control,* Lynne Rienner, Boulder 2001, p. 11.
41 Alibek-Handelman, *op.cit.,* p. 112.
42 Croddy, *op.cit.,* p. 234.
43 Alibek-Handelman, *op.cit.,* p. 112.
44 Rimmington, *op.cit.,* p. 23.

By 1987, the Soviets had the capacity to make 200 kg of super plagues every week, enough to kill 500,000 people.[45]

On April 2, 1979, an anthrax aerosol was accidentally released from the Scientific Research Institute in Sverdlovsk, and killed sixty-eight people.[46] German media in contact with Soviet immigrants reported that the incident resulted in the death of more than 60 people in Sverdlovsk. When Western states protested over this violation of the BTWC, Moscow denied the allegations and said that the epidemic was caused by meat bought on the black market,[47] a statement similar to the allegations we hear today that the COVID-19 pandemic began in an animal market. TASS, the official news agency of the Soviet Union, reported on June 12, 1980, that people died in Sverdlovsk because of an anthrax pandemic among local animals.[48]

In the West, two people were the main source of allegations about the Soviet Union's clandestine BW program. First, Vladimir Pasechnik, head of the Institute of Ultra-Pure Biopreparations in Leningrad, defected to the UK in October 1989 and provided detailed information about Soviet research. Based on information provided by Pasechnik, on April 30, 1990, the US and the UK ambassadors to Moscow officially requested that the Soviet Union terminate its secret BW activities.[49]

The second source, Kanatzhan Bayzakovich Alibek (called Ken Alibek), was Deputy Director of Biopreparat program and exfiltrated by the American agencies to the US in 1992, where he provided detailed and critical information about secret Soviet programs. He said that the

45 Pearce Wright, "Vladimir Pasechnik: Defector Who Alerted the West to the Danger of Soviet Biological Weapons Production", *The Guardian,* 28 November 2001.
46 Rimmington, *op.cit.,* p. 23.
47 "Soviet Biological Warfare Threat", *The US Department of Defense Intelligence,* https://nsarchive2.gwu.edu/NSAEBB/NSAEBB61/Sverd26.pdf, (Date of Accession: 25.05.2020); Croddy, *op.cit.,* p. 234.
48 Alibek-Handelman, *op.cit.,* p. 73.
49 Mangold-Goldberg, *op.cit.,* p. 107.

BW program reached its peak in late 1980s and employed more than 60,000 people at that time. Of those, 30,000 worked only in Biopreparat, where they had a budget of $1 billion.[50] He also emphasized that Soviet scientists conducted open-air BW tests in different parts of the Soviet Union between 1979 and 1989, including ballistic missiles tests with BW warheads between 1960 and 1980. [51]

In 1987, General Secretary Mikhail S. Gorbachev approved a secret decree that ordered a gradual scaling back of the BW program.[52] In 1992, Boris Yeltsin admitted that the Soviet Union pursued a secret BW program which he ordered to end. He also ordered the destruction of all existing BW. Yeltsin further allowed for the establishment of an international investigation team to investigate the Sverdlovsk incident. It is worth noting that microbiologist Igor Domaradsky, who also worked in the Biopreparat as a manager said that the Soviet Union had stopped its BW program in 1989, right after Pasechnik defected to the UK.[53]

In the early post-Cold War era, nonproliferation has become the main security issue in the West, which was very concerned with the fate of the remaining BW facilities, materials and research in the former Soviet states. As Cordesman has highlighted, about 5.000 scientists and 10.000 technical people involved in the former Soviet BW program represent an imminent threat to the world. The US, UK, and Soviet-Russia launched a trilateral program to verify compliance with the BTWC, which included non-military sites that performed BW activities in 1991 and 1994. In the years after Yeltsin's order, various Biopreparat facilities were dismantled or converted to peaceful research and pharmaceutical production: the massive BW agents production facility in Stepnogorsk (Kazakhtan) was

50 Alibek-Handelman, *op.cit.,* p. 89.
51 Alibek-Handelman, *op.cit.,* p. 68.
52 Zilinskas, *op.cit.,* p. 50.
53 Domaradsky-Orent, *op.cit.,* p. 271.

demolished.[54] Thus, it seems the former Soviet BW program which had been the world's oldest, largest and longest-lasting and the only one to develop a weapons-on-demand mobilization system focused on massively incorporating modern genetic techniques into weapons development, was ended.[55]

However, despite funds provided by the US, the West continued to harbor doubts over the Russian BW facilities because of Russia's secrecy and refusal to allow foreign inspectors.[56] These doubts focus on a fear that Russia continues clandestine BW activities in installations in Kirov, Yekaterinburg, Sergiev Posad, and Saint Petersburg that have remained off-limits to Western scrutiny.[57] These doubts were intensified starting in 2010 by Russia's rejection of financial assistance through the Biological Threat Reduction Programs, withdrawal from participation in 2015.[58]

On the other hand, rising tensions and an arms race between the US and Russia heralded a new competition in several areas. Putin openly stated that Russia would, in addition to its existing NW, develop new weapons using advanced technologies including genetics to provide fundamentally new instruments for achieving its political and strategic goals.[59] Thus Putin hinted at research activities on new types of BW based on genetic engineering.

54 Zilinskas, *op.cit.*, p. 51.
55 Kuhn-Leitenberg, *op.cit.,* p. 80.
56 Judith Miller, "U.S. Aid Is Diverted to Germ Warfare, Russian Scientists Say", *The New York Times,* 25 January 2000.
57 Ben Aris et al., "Warning of Smallpox Terror Risk", *The Telegraph,* 6 November 2001.
58 Filippa Lentzos, "What happened After An Explosion at a Russian Disease Research Lab Called VECTOR?", *Bulletin of the Atomic Scientists,* https://thebulletin.org/2019/11/what-happened-after-an-explosion-at-a-russian-disease-research-lab-called-vector/#, (Date of Accession: 12.07.2020).
59 Aleksey Nikolski, "Being Strong: National Security Guarantees for Russia", *Russia Today,* https://www.rt.com/russia/official-word/strong-putin-military-russia-711/, (Date of Accession: 10.07.2020).

RUSSIAN BW PROGRAM IN THE RUSSIAN SOURCES

Russian sources indicate that Soviet BW program started on August 22, 1925 with Resolution N-861 of the Revolutionary Military Council that ordered the establishment of a Military Chemical Agency within the Red Army.[60] The Agency focused on research in military chemistry and military biology and collaborated with the A.N. Ginburg laboratory in Moscow which had extensive experience in military uses of biology.[61] Yakov Fishman, head of the agency, prepared reports for government officials in 1926 and 1927 underlining that the Ginsburg laboratory has made important progress in military biology by testing Siberian ulcer (a Russian ground (It might be better to say "powdered" rather than "ground.") anthrax) on animals and had done extensive research on the military use of microbes. The first BW tests led by A.N. Ginsburg were carried out in 1926-1927 in Kuzminzki region using Siberian ulcer.

The Agency established its first laboratory in 1928 in Suzdal to study pathogenic microorganisms and a second laboratory, called Vaccine-Sera, in Vlasikha to study vaccination and serum.[62] Ivan Velikanov, a young scientist and the Head of Department of Microbiology at Moscow State University, was appointed to lead the Vaccine-Sera laboratory.[63] He constantly prepared reports to his superiors underlining the possibility of biological warfare and urged the Revolutionary Military Council to consider

60 "Glavnoye Voenno-Himicheskoye Upravleniye Krasnoi Armiyi", *Rus Archives,* http://guides.rusarchives.ru/node/16305, (Date of Accession: 26.07.2020).

61 Vladimir Brovko, "Kto i Kogda v SSSR Sozdal Biologicheskoye Orujiye?", *Pravda*, https://narodna.pravda.com.ua/history/4f65271176b91/view_print/, (Date of Accession: 26.07.2020).

62 Lev Fedorov, *Sovetskoye Biyologicheskoye Orujiye: İstoriya, Ekologiya, Politika,* Publication by MCoEC, Moskow 2005, p. 17-29.

63 Konstantin Vasiljev, "Tragediya Russkoi Mikrobiyologiyi", *Acta Medico-Historica Rigensia,* 1(20), 1992, p. 279.

this possibility seriously.[64] Fedorov, however, argued that adversaries of the Soviet Union did not have BW capabilities that could threaten the country and Soviet leaders were, in essence, aiming to reach biological warfare capability before Western states.[65] Historical documents bolster his argument because BW research programs were started by Japan in 1932[66], by the UK in 1934[67] and by the US in 1942.[68]

In 1934, the newly formed Red Army Scientific-Medical Institute combined military laboratories in Suzdal and Vlasikha and was relocated from Moscow to Suzdal District of Vladimirsk province out of fear that employees could disseminate viruses to residents of Moscow.[69] The Institute employed three famous microbiologists, I.M.Velikanov, E.I.Demikhovski, and N.Ginsburg and focused its activities on offensive and defensive BW and CW capabilities.[70] The organization, known formally as the Biotechnical Institute, was led by Velikanov and employed 65 researchers to study pathogens effective against humans and animals. Additionally, in 1934, a special institute for the conduct of anti-plague studies was established in Irkutsk.

Testing of advanced BW was an important part of this program. A report prepared by Fishman on February 10, 1928 suggested that islands on which BW could be tested should be around 15-25 km² in area and be at least 10 km from the coast. Based on Fishman's report, Gorodomliya

64 Yuri Solomonov, "Çelovek v Mire Epidemiyi", *NG,* http://www.ng.ru/stsenarii/2014-10-28/9_epidemy.html, (Date of Accession: 26.07.2020).

65 Fedorov, *op.cit.,* p. 14.

66 Harris, *op.cit.*, p. 14.

67 Robert Harris-Jeremy Paxman, *A Higher form of Killing. The Secret Story of Gas and Germ Warfare,* Chatto and Windus Publishers, London 1982, p. 274.

68 Vladimir Miyasnikov, *Zaşita Ot Orujiya Massovogo Porajeniya,* Publication by Voenizdat, Moskow 1989, p. 399.

69 Nikolay Kostochkin, "Podopytnye Lyudy: Zhertvami Biologicheskogo Oruzhiya Stanovilis Sluchayniye Grazhdane", *Nasha Versiya Newspaper,* 23(448), 2014, p. 14.

70 Lev Fedorov, *Ot Hlora i Fosgena Do "Novichka". İstoriya Sovetskogo Himicheskogo,* Algoritm, Moskow 2019, p. 38.

in Lake Seliger, Vozrozhdeniye in the Aral Sea the island of Soloveskiye in the White Sea were selected as primary tests sites.

Tests were also conducted in the Shyhan Military Chemistry Polygon in Saratov province in 1934 and in Orenburg by scientists at the V.Chkalov Institute.[71]

Based on these studies and trials, the Soviet Union had enough experts to conduct in-depth scientific research in bacteriology, virology, and epidemiology, and produced a huge amount of vaccines, serums, and other materials ready for use in biological attacks just before the WWII. A research laboratory located in Tobolsk, for example, produced a large number of anthrax spores ready to deploy on a battlefield. As Fedorov highlighted in 1936, the Soviet Union had the capacity to produce as much BW, including anthrax and tularemia, that the Red Army might need. Soviet scientists also had BW in the form of tularemia bacterium in the Sanitary Technical Institute in 1941.[72]

In 1946, Stalin ordered the establishment of a second military biology institute, Sverdlovsk-19, in Ekaterinburg. The institute focused on studying documents from Japan's BW programs seized in Manchuria after the war.[73] A Veterinary Microbiological Institute, Zagorsk-6, was established in Zagorsk in 1954. Here scientists cultivated viruses of smallpox and Venezuelan equine encephalomyelitis in chicken egg embryos.[74] They also produced an immunoglobulin for the prevention of Ebola.[75]

71 V. Boisov, *Voennaya Biologiya v SSSR Na Rubezhe 20-40 Godov Rukopis,* 1995, p. 41.

72 Lev Fedorov, *Mikroubisi İz Probirok. Shit İli Mech Protiv Zapada*, Rodina Publication, Moskow 2018, p. 64.

73 Vladimir Voronov, "Ohotniki Za Boevymi Shtammami. Kak Krasnaya Armiya Perenimala v Machjuriyi Opit Yaponskih Razrabotchikov Bakteriologicheskogo Orujiya", *Novaya Gazeta,* https://novayagazeta.ru/articles/2020/05/05/85223-ohotniki-za-boevymi-shtammami, (Date of Accession: 09.05.2020).

74 Lev Fedorov, "Podgotovka K Nastupatelnoi Biyologiçeskoi Voine. Voennaya Sistema Biyologicheskoi Voini", *Levfedorov,* http://levfedorov.ru/bioweapon-2-02/, (Date of Accession: 07.07.2020).

75 Vadim Udmansev, "Voennaya Mikrobiyologiya Rossiyi: Virusologiçeskomu Sentru Ministerstva Oboronı Rossiyi İspolnilos 50 Let", *Voenno-Promishlenny Kurer,* 16(33), 2004, p. 7.

In 1970s, molecular biology and genetic engineering, which allowed scientists to change the genetics of a living organism, emerged as one of the most important new sciences in the West. Soviet scientists convinced officials that their country was lagging behind Western states in these areas.[76] Soviet scientists soon increased their activities and developed biological agents that were more effective than anthrax and the plague. They focused on new scientific discoveries on BW as battlefield weapons. This period is called the second-generation BW program of the Soviet Union.

Despite signing the BTWC in 1972, the Soviet Union reorganized non-military agencies involved in the development of BW programs to cover its secret research program. However, these non-military agencies were directed by generals and functioned according to directives issued by the Soviet Chief of General Staff.[77] The All-Union Science Production Association Biopreparat, which was also known simply as Biopreparat, was established in 1973 as a civilian pharmaceutical company that consisted of forty research and development centers and production facilities. This was done to mask Soviet clandestine BW programs and to make it possible to conduct a massive BW program under an autonomous budget controlled by the MOD.[78]

To accelerate its BW attack capabilities, the Soviet Union established the Interdepartmental Scientific-Technical Council for Molecular Biology and Genetics under the Main Administration of the Microbiological Industry (Glavmikrobioprom). The council was charged with leading Biopreparat to prepare scientific programs and coordinate BW programs being performed by various government agencies.

76 Ekaterina Gnatik, "Gennaya İnzheneriya i Biologicheskaya Bezopasnost", *Vestnik RUDN,* Seriya Yuridicheskiye Nauki, 2, 2004, p. 82.

77 Fedorov, *loc.cit.*

78 Vyacheslav Yankulin, "Sindrom Chumy, İli Khozhdeniye Po Mukam Odnogo İz Sozdateley Bakteriologicheskogo Oruzhiya", I*zvestiya Newspaper,* 15 October 1997, p. 5.

Departments in Biopreparat specialized in specific areas. The Institute of Applied Microbiology in Obolensk, for example, had an intense research and development program on pathogenic strains of bacteria. In 1974, the State Research Center of Virology and Biotechnology (VEKTOR) was formed in Koltsovo to specialize in the production of BW based on viruses and conducted studies with viral hemorrhagic fevers—Ebola, Marburg, Lassa, Argentine, and Bolivian viruses. The State Scientific Institute of Ultrapure Biological Preparations in Leningrad, which was established in 1974, did research on drug-resistant plague. The Institute also developed a tool to transform a mixture of bacteria and viruses into powder used by a BW dispersal system that was designed to be used on battlefields by aircrafts through airflow.

The Institute of Applied Biochemistry in Omutninsk established in 1973 focused on plague and tularemia bacteria, and the Siberian Branch of the Institute of Applied Biochemistry established in the city of Berdsk in 1975 did research on brucellia. The Institute of Engineering Immunology established in 1980 in Lyubuchany aimed to evade the harmful effects on immune system of targeted people if pathogens were used against the Soviet Union. They also focused on strengthening the immune system if Soviets had to respond to a BW attack. According to Fedorov, the Soviet Union stretched its resources to produce 1,500 tons of bubonic plague, 4,500 tons of Siberian ulcer, 1,500 tons of tularemia, 2,000 tons of glanders, 100 tons of natural smallpox, 250 tons of Marburg virus and 150 tons of Venezuelan equine encephalitis virus yearly.[79]

On April 4, 1979, many people living in Sverdlovsk started to complain of high fever, loss of consciousness, coughs, and vomiting.[80] Many scientists argued that this was caused by a dry form of anthrax, which

79 Lev Fedorov, *Sovetskoye Biyologicheskoye Orujiye: İstoriya, Ekologiya Politika,* Publication by MCoEC, Moskow 2005, p. 46-89.

80 İvan Zhilin- Marshal Yazvi, "41 God Nazad v Sverdlovske Nachalas Epidemiya Sibirskoi Yazvi", *Novaya Newspaper,* 70(3080), 2020, p. 19.

was produced secretly for Soviet military arsenals on 30 March 1979 in Sverdlovsk-19, because employees of the secret BW facility temporarily removed a clogged filter and continued to work without replacing it. The first death from anthrax, of Officer F. Nikolayev, a Sverdlovsk-19 employee, occurred on April 2. Then people and animals started to die across in the city. On April 10, the first autopsy was performed at City Hospital Number 40 and the diagnosis was Siberian skin ulcer.[81]

On 21 April, death rates increased and, as a second wave of the disease began to occur, the civilian population was vaccinated. The Soviet authorities alleged that dissemination of Siberian ulcer among domestic animals was the cause of the incident. However, in November 1979 a Russian journal published in West Germany by a Soviet emigrant pointed out that the disease was caused by an explosion at a military factory in Sverdlovsk that caused deadly bacteria to enter the atmosphere.[82] Some reports, arguably, highlighted that the majority of deaths were of adult men and the disease did not affect the majority of women[83] and the symptoms of the disease were never seen in children and young people[84]. Those reports actually imply that the biological agent was designed to target enemy military personnel.

After the dissolution of the Soviet Union in the 1990s, the country's authorities were unable to continue developing BW[85] because of the pressures from US and UK at the presidential level. On April 11, 1992, former President Boris Yeltsin signed a decree for the fulfillment of international obligations concerning BW. According to the decree, Russia

81 Sergei Pluzhnikov-Aleksei Shvedov, "Ubiytsa İz Probirki" *Sovsekrento,* https://www.sovsekretno.ru/articles/ubiytsa-iz-probirki/, (Date of Accession: 24.04.2020).

82 Lev Fedorov, "Epidemiya "Sverdlovsk-1979", *Levfedorov,* http://levfedorov.ru/bioweapon-3-02/, (Date of Accession: 27.04.2020).

83 N. Zenova-Voennaya Taina, "Priçini Tragediyi, Sluchivsheisiya v Sverdlovske, Doljni Bit Rassledovani", *Literaturnaya Newspaper,* 22 August 1990.

84 S. Volkov, U Ekaterinburga Bil Svoi "Chernobil", *Uralski Rabochi Newspaper,* 11 April 1998.

85 A. E. Simonova, "Bioterrorizm Kak Ugroza Nasionalnoi Bezopasnosti Rossiyi", Nasionalnoye Bezopasnost: *Nauçnoye i Gosudarstvennoye Upravlençeskoye,* S. S. Sulakshin ed., Nauchny Ekspert Publication, Moskow 2010, p. 494.

affirmed its commitment to the BTWC and banned the production and the use of biological and toxin weapons that were outlawed by the BTWC.[86]

Russia collaborated with the US to support nonproliferation in the early post-Cold War years. However, increased tension with the West has changed the approaches, because statements by Russian officials has increased suspects for secret research activities. Especially, president Putin's article that heralded research of new weapons based on new physical principles, including genetic, and stated that these weapons systems will be comparable in terms of results with NW, but more "acceptable" in political and military terms[87], for example, is regarded as a sign for secret BW research activities.[88] On March 1, 2018 in a speech to the Federal Assembly, he also emphasized that the country has made important progress in this research.[89]

CONCLUSION

Except for a few uses in the battlefield and some terrorist cases that caused low-level casualties, deliberate use of BW has not produced large casualties or destruction in the history. But this does not mean that BW are not dangerous or could not produce mass casualties. Although they have not found a role in the battlefield, biological threats have been a potential dangerous for human race. People feel very threatened by the existence of viruses or living organisms that could cause mass death and destruction.

86 Lev Fedorov, Kruşeniye Voenno-Biologiçeskoi İmperiyi, *Levfedorov,* http://levfedorov.ru/bioweapon-4-04/, (Date of Accession: 04.05.2020).

87 "Vladimir Putin, Bit Silnimi: Garantiyi Nasionalnoi Bezopasnosti Dliya Rossiyi", *RG,* https://rg.ru/2012/02/20/putin-armiya.html, (Date of Accession: 07.05.2020).

88 Yuri Fedorov, "Biyologicheskaya Voina 2.0. Yuri Fedorov O Patoy Probleme", *Svoboda,* https://www.svoboda.org/a/30593521.html, (Date of Accession: 24.04.2020).

89 "Putin Rasskazal O Noveishih Vidah Rossiskogo Voorujeniya", *Ria,* https://ria.ru/20180301/1515566394.html, (Date of Accession: 17.04. 2020).

Due to the inherent characteristics of BW, as clandestine researches, manufacturing of them has been possible for some states in the past and today. Their dual use functions, which refers both peacefully and weapon-based use of biological agents, make some states to maintain their secret BW capabilities, as it did in the Soviet Union during the Cold War.

Some statements and rumors, most of which are highly non-scientific but very effective in directing public opinion like of the former US president Trump, for example, accused China of spreading COVID-19 through an accidental leak at a research center in Wuhan that has a secret BW program. China vehemently denied this, and we will not know the exact truth until and unless an inspection is conducted by an unbiased international organization. However, mistrust in the international area has been one of the most prevailing norms for a long time, even China, which was the victim of the biggest BW trials on humans in the history, most possibly will not allow an international investigation.

Although it is one of the states that has suffered most to date from the COVID-19 pandemic, Russia has most possibly conducted a secret BW program about which there are several sound proofs in Russian and Western sources. Russia, in Yeltsin administration officially admitted that it secretly conducted a clandestine BW program during the Cold War and declared that it has destroyed existing capabilities and weapons. However, Putin administration has officially retracted the Yeltsin admission that the Soviet Union had a clandestine BW program and then calls by the international community for on-site inspections in some of the former facilities has been rejected by Russian officials.

The question we face is this: if Russia still conducts a clandestine massive BW program that is largely free from Western and international scrutiny, do we risk seeing an end to BW nonproliferation? This question is especially crucial now that the COVID-19 pandemic has reminded the

whole world about the danger of BW. Will this reminder serve as a wake-up call to the World regarding any BW activity?

Both sides have started to scrap Cold War agreements such as the ABM and INF, which provided relative peace with regard to WMDs. Therefore, the recent escalation of tension between Russia and the US has started a new arms race, including WMD, that is expected to increase secret armament in both sides as well in other states. Therefore, a significant degree of mistrust and suspicion between Russia and the West will likely remain for a long time.

On the other hand, the COVID-19 pandemic has proved how new-generation biological agents could be highly effective in a globalized world. While most battlefield BW agents are selected because they are not contagious, COVID-19 pandemic case might stimulate new interest in BW. It is highly likely that states and terror organizations that do not possess nuclear capabilities may intensify their efforts to acquire BW.

REFERENCES

"Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction", *Disarmenent*, http://disarmament.un.org/treaties/t/bwc/text, (Date of Accession: 22.04.2020).

"Glavnoye Voenno-Himicheskoye Upravleniye Krasnoi Armiyi", *Rus Archives*, http://guides.rusarchives.ru/node/16305, (Date of Accession: 26.06.2020).

"Putin Rasskazal O Noveishih Vidah Rossiskogo Voorujeniya", *Ria*, https://ria.ru/20180301/1515566394.html, (Date of Accession: 17.04.2020).

"Soviet Biological Warfare Threat", *Prepared for the US Department of Defense Intelligence*, https://nsarchive2.gwu.edu/NSAEBB/NSAEBB61/Sverd26.pdf, (Date of Accession 25.05.2020).

ALIBEK, Ken-Stephen Handelmen, *Biohazard: The Chilling Story of the Largest Covert Biological Weapons Program in the World*, Random House, New York 1999.

American Scientific, *Understanding Germ Warfare*, Warner Books, New York 2002.

ARIS, Ben et al., "Warning of Smallpox Terror Risk", *The Telegraph*, 06 November 2001.

BALMER, Brian, *Britain and Biological Warfare: Expert Advice and Science Policy 1930-1965*, Palgrave, London 2001.

BARENBLATT, Daniel, *A Plague upon Humanity: The Secret Genocide of Axis Japan's Germ Warfare Operation*, Harpercollins, New York 2004.

BARNABY, Wendy, *The Plague Makers: The Secret World of Biological Warfare*, The Bath Press, London 1999.

BLOCK, M. Steven, "Living Nightmares: Biological Threats enabled by Molecular Biology", *The New Terror: Facing the Threat of Biological and Chemical Weapons*, Drell Sidney D. et al., ed., Hoover Institution Press, Stanford 1999, p. 39-75.

BOISOV, V., *Voennaya Biologiya v SSSR Na Rubezhe 20-40 Godov, Rukopis*, 1995.

BROVKO, Vladimir, "Kto i Kogda v SSSR Sozdal Biologicheskoye Orujiye?", *Pravda,* https://narodna.pravda.com.ua/history/4f65271176b91/view_print/, (Date of Accession: 21.07.2020).

Center for Nonproliferation Studies, "Chronology of State Use and Biological and Chemical Weapons Control", *Monterey Institute of International Studies*, http://cns.miis.edu/research/cbw/pastuse.htm, (Date of Accession: 11.04.2020).

CHRISTOPHER, George et al., "Biological Warfare: A Historical Perspective", *Biological Weapons: Limiting the Threat*, Joshua Lederberg, ed., The MTI Press, Cambridge 2001, p.17-36.

CRODDY, Eric, *Chemical and Biological Warfare: A Comprehensive Survey for the Concerned Citizen*, Springer, New York 2002.

DANDO, Malcolm, *The New Biological Weapons Threat*, Proliferation and Control, Lynne Rienner, Boulder 2001.

DOMARADSKY, Igor V-Wendy Orent, *Biowarrior: Inside the Soviet/Russian Biological War Machine*, Prometheus Books, New York 2003.

DURANTY, Walter, "Soviet Threatens to Use Gas in War", *The New York Times*, 23 February 1938.

FEDOROV, Lev, "Epidemiya Sverdlovsk-1979", *Levfederov*, http://levfedorov.ru/bioweapon-3-02/, (Date of Accession: 27.04.2020).

FEDOROV, Lev, "Kruşeniye Voenno-Biologiçeskoi İmperiyi", *Levfederov*, http://levfedorov.ru/bioweapon-4-04/, (Date of Accession: 04.05.2020).

FEDOROV, Lev, "Podgotovka K Nastupatelnoi Biyologiçeskoi Voine. Voennaya Sistema Biyologicheskoi Voini", *Levfederov*, http://levfedorov.ru/bioweapon-2-02/, (Date of Accession: 07.06.2020).

FEDOROV, Lev, *Mikroubisi* İz *Probirok. Shit İli Mech Protiv Zapada*, Rodina Publication, Moskow 2018.

FEDOROV, Lev, *Ot Hlora i Fosgena Do "Novichka". İstoriya Sovetskogo Himicheskogo Orujiya*, Algoritm, Moskow 2019.

FEDOROV, Lev. *Sovetskoye Biyologicheskoye Orujiye: İstoriya, Ekologiya, Politika*, MCoEC Publication, Moskow 2005.

FEDOROV, Yuri, "Biyologicheskaya Voina 2.0. Yuri Fedorov O Patoy Probleme", *Svoboda*, https://www.svoboda.org/a/30593521.html, (Date of Accession: 24.07.2020).

GNATIK, Ekaterina, "Gennaya İnzheneriya i Biologicheskaya Bezopasnost", *Vestnik RUDN, Seriya Yuridicheskiye Nauki*, 2, 2004, p. 79-88.

HAAR, Barend Ter, *The Future of Biological Weapons*, The Washington Papers, The Center for Strategic and International Studies, Washington D.C. 1991.

HARRIS, Robert-Paxman Jeremy, *A Higher form of Killing. The Secret Story of Gas and Germ Warfare*, Chatto and Windus Publishers, London 1982.

HARRIS, Robert-Paxman Jeremy, *A Higher Form of Killing: The Secret History of Chemical and Biological Warfare*, Random House, New York 2002.

HARRIS, Sheldon H., *Factories of Death: Japanese Biological Warfare, 1932-1945, and the American Cover Up*, Routledge, New York 2002.

KOPLOW, David A., *Smallpox: The Fight to Eradicate a Global Scourge*, University of California Press, Berkeley 2003.

KOSTOCHKIN, Nikolay, "Podopytnye Lyudy: Zhertvami Biologicheskogo Oruzhiya Stanovilis Sluchayniye Grazhdane", *Nasha Versiya Newspaper*, 23(448), 2014.

KUHN, Jens H.-Leitenberg Milton, "The Soviet Biological Weapons Program", Filippa Lentsoz ed., *Biological Threats in the 21st Century: The Politics, People, Science and Historical Roots*, Imperial College Press, London 2016, p. 79-102.

LEITENBERG, M. et al., *The Soviet Biological Weapons Program: A History*, Harward University Press, London 2012.

LENTZOS, Filippa, "What Happened After An Explosion at A Russian Disease Research Lab Called VECTOR?", *Bulletin of the Atomic Scientists*, https://thebulletin.org/2019/11/what-happened-after-an-explosion-at-a-russian-disease-research-lab-called-vector/, (Date of Accession: 12.07.2020).

LEVINE, Herbert M., *Chemical and Biological Weapons in Our Times,* Franklin Watts Publisher, New York 2000.

MANGOLD, Tom-Goldberg Jeff, *Plague Wars: The Terrifying Reality of Biological Warfare*, St. Martin's Press, New York 1999.

MILLER, Judith, "U.S. Aid Is Diverted to Germ Warfare, Russian Scientists Say", *The New York Times*, 25 January 2000.

MILLER, Judith, et al., *Germs: Biological Weapons and Americas Secret War*, Touchstone, New York 2002.

MIYASNIKOV, Vladimir, *Zaşita Ot Orujiya Massovogo Porajeniya*, Voenizdat Publication, Moskow 1989.

NIKOLSKI, Aleksey, "Being Strong: National Security Guarantees for Russia", *Russia Today*, https://www.rt.com/russia/official-word/strong-putin-military-russia-711/, (Date of Accession: 10.06.2020).

OSTERHOLM, Michael T.-John Schartz, *Living Terrors: What America Needs to Know to Survive the Coming Bioterrorist Catastrophe*, Delta Press, New York 2000.

PLUZHNIKOV, Sergei, "Aleksei Shvedov, Ubiytsa İz Probirki", *Sovsekretno*, https://www.sovsekretno.ru/articles/ubiytsa-iz-probirki/, (Date of Accession: 24.04.2020).

PUTIN, Vladimir, "Bit Silnimi: Garantiyi Nasionalnoi Bezopasnosti Dliya Rossiyi", *RG*, https://rg.ru/2012/02/20/putin-armiya.html, (Date of Accession: 07.05.2020).

REGIS, Ed, *The Biology of Doom: The History of America's Secret Germ Warfare Project*, Henry Holt and Company, New York 1999.

RIMMINGTON, Anthony, *Stalin's Secret Weapon: The Origins of Soviet Biological Warfare*, Oxford University Press, New York 2018.

SCHNEIDER, Barry R., "Bio-Defense Readiness; Thoughts after September 11th.", *The Gathering Biological Warfare Storm*, Schneider Barry Jim-Davisi, eds., USAF Counterproliferation Center, Alabama 2002.

SIMONOVA, A. E., "Bioterrorizm Kak Ugroza Nasionalnoi Bezopasnosti Rossiyi", *Nasionalnoye Bezopasnost: Nauçnoye i Gosudarstvennoye Upravlençeskoye Soderjaniye*, Sulakshin S. S., ed., Nauchny Ekspert Publication, Moskow 2010.

SOLOMONOV, Yuri, "Çelovek v Mire Epidemiyi", *NG*, http://www.ng.ru/stsenarii/2014-10-28/9_epidemy.html, (Date of Accession 03.05.2020).

SPIERS, Edward M., *Chemical and Biological Weapons: A Study of Proliferation*, St. Martin's Press, New York 1994.

UDMANSEV, Vadim, "Voennaya Mikrobiyologiya Rossiyi: Virusologiçeskomu Sentru Ministerstva Oboronı Rossiyi İspolnilos 50 Let", *Voenno-Promishlenny Kurer*, 16(33), 2004.

VASILJEV, Konstantin, "Tragediya Russkoi Mikrobiyologiyi", *Acta Medico-Historica Rigensia*, 1(20), 1992.

VOLKOV, S., "U Ekaterinburga Bil Svoi Chernobil", *Uralski Rabochi Newspaper*, 11 April 1998.

VORONOV, Vladimir, "Ohotniki Za Boevymi Shtammami. Kak Krasnaya Armiya Perenimala v Machjuriyi Opit Yaponskih Razrabotchikov Bakteriologicheskogo Orujiya", *Novaya Gazeta*, https://novayagazeta.ru/articles/2020/05/05/85223-ohotniki-za-boevymi-shtammami, (Date of Accession: 09.05.2020).

VYACHESLAV, Yankulin, "Sindrom Chumy, İli Khozhdeniye Po Mukam Odnogo İz Sozdateley Bakteriologicheskogo Oruzhiya", *Izvestiya Newspaper*, 15 October 1997.

WRIGHT, Pearce, "Vladimir Pasechnik: Defector Who Alerted the West to the Danger of Soviet Biological Weapons Production", *The Guardian*, 28 November 2001.

WRIGHT, Susan, "Geopolitical Origins", *Biological Warfare and Disarmament*, Susan Wright ed., Rowman&Littlefield, New York 2002.

ZENOVA, N., "Voennaya Taina. Priçini Tragediyi, Sluchivsheisiya v Sverdlovske, Doljni Bit Rassledovani", *Literaturnaya Newspaper*, 22 August 1990.

ZHILIN, İvan, "Marshal Yazvi. 41 God Nazad v Sverdlovske Nachalas Epidemiya Sibirskoi Yazvi", *Novaya Newspaper*, 6 July 2020.

ZILINSKAS, Raymond A., "The Anti-Plague System and the Soviet Biological Warfare Program", *Critical Reviews in Microbiology*, 34, 2006.