

BIOLOGICAL WEAPONS IN THE FORMER SOVIET UNION: AN INTERVIEW WITH DR. KENNETH ALIBEK

Conducted by Jonathan B. Tucker

*On November 6, 1998, Dr. Kenneth Alibek (formerly Kanatjan Alibekov) visited the Center for Nonproliferation Studies in Monterey and met with the staff of the Chemical and Biological Weapons Nonproliferation Project (CBWNP). Dr. Alibek's recent book (with Stephen Handelman), **Biohazard: The Chilling True Story of the Largest Covert Biological Weapons Program in the World** (Random House, 1999), describes his experience with Soviet/Russian biological warfare (BW) activities. A native of Kazakhstan, medical doctor, and officer in the Red Army, he worked from 1975 to 1992 for the Soviet Biopreparat complex, an ostensibly civilian pharmaceutical production association that was actually a top-secret branch of the Soviet biological weapons program. Dr. Alibek rose through the ranks to become the chief scientist and first deputy director of Biopreparat in 1988. After leaving Russia in 1992, he emigrated to the United States. He is currently serving as Chief Scientist with Hadron, Inc., a technical services company in Annandale, Virginia. During his visit to Monterey, Dr. Alibek was interviewed by CBWNP Director Jonathan B. Tucker. An edited version of the interview is provided here.*

Are biological weapons really weapons of mass destruction?

A better term is "mass-casualty weapons" because they do not destroy buildings, cities, or transportation. They unfortunately just destroy human lives.

When did the Soviet BW program begin?

The Soviet Union started developing biological weapons in the 1920s. The first attempts to create biological weapons were based on quite primitive techniques. Whole animals were infected, and when they developed a significant clinical picture, they were killed, dried, and ground up into a powder.

How did you get involved in the Soviet BW program?

I graduated as a physician from the military medical institute, and in 1975 I received an offer to work for the government of the Soviet Union. Nobody knew what kind of work we were going to be asked to do, but it was

considered an honor to make a contribution to the nation's defense. I came to the Berdsk facility in 1976 and worked there until 1980, when I was transferred to Omutninsk. Six years after graduation, when I was 30 years old, I became a deputy director of the institute, and two years later I became director. When I was just 37, I became the scientific leader of the entire Biopreparat complex, which was responsible for creating most of the modern biological weapons for the Soviet Union. I personally developed three versions of a tularemia biological weapon, a sophisticated plague biological weapon, and a dry form of anthrax that is one of the most powerful biological weapons in the world today. I finished this work in 1987 and received all possible promotions and raises for this development.

Why did young medical scientists like you agree to develop such weapons?

At first I had a lot of doubts because I had given my oath as a physician not to cause harm. But you need to imagine the internal political situation in the Soviet

Union. For many years we were told that we needed to protect our country from a very strong enemy, armed with sophisticated weapons, that wanted to destroy us—the United States and its NATO allies. We were also told that there was reliable intelligence that the United States was continuing to develop biological weapons, and that our program was a response to the US program. When every single day you are told that there is an enemy whose missiles and planes are targeted on the Soviet Union, this propaganda unfortunately works perfectly.

How capable was the Soviet BW program?

The Soviet Union had the most efficient, sophisticated, and powerful offensive BW program in the world. It developed a completely new class of weapons based on genetically modified agents. For example, during the 1980s, the Soviet Union developed antibiotic-resistant strains of plague, anthrax, tularemia, and glanders. We came closer and closer to developing so-called “absolute” biological weapons. The 836 strain of anthrax, for example, was extremely virulent, stable in aerosol form, and persistent in the environment. The high virulence of this strain was based on several factors, including a thick protective capsule and an ability to produce large amounts of toxin. In 1985 I compared the 836 strain with strains of anthrax obtained from all over the world, and nothing was better.

What was Soviet military doctrine for the use of biological weapons?

Under Soviet military doctrine, biological weapons were divided into three main categories: strategic biological weapons, operational biological weapons, and strategic-operational biological weapons. 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 our own troops. Smallpox and plague were developed for this purpose because of their high mortality rate, contagiousness, and ability to cause epidemics or even pandemics.

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. These agents, 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. Finally, strategic-operational biological weapons would be used to strike both strategic and operational targets. In his case we are talking about agents such as anthrax and the rickettsial disease Q fever.

In 1989, I met with the general in charge of the 15th Directorate [of the Soviet Ministry of Defense] to discuss the final list of biological weapons that would be used in future wars. We decided to replace brucellosis and Q fever with newer agents. Brucellosis would be replaced by glanders, a more efficient weapon. And instead of Q fever, I’m sorry to say, I suggested Marburg virus, a deadly hemorrhagic fever. The final list included smallpox and plague as strategic weapons; tularemia, glanders, and VEE as operational weapons; and anthrax and Marburg virus as strategic-operational weapons. Several other agents were under development, including Lassa fever, Ebola, Machupo virus, Bolivian hemorrhagic fever, Argentine hemorrhagic fever, and Russian spring-summer encephalitis.

Did the Soviet Union also develop toxins as operational weapons?

The last significant attempts to develop toxin weapons were undertaken in the 1970s, probably up to 1975. Soviet doctrine was to apply biological weapons in massive amounts to create very high concentrations of these agents over very large areas. The problem with toxin weapons is that they do not replicate. Thus, toxin weapons are simply a type of chemical weapon produced by biotechnological means.

Did the Soviet Union ever develop mycotoxins, the so-called “yellow rain” weapons?

No, I have been asked this question many times, and I don’t believe [the allegations].

How did the Soviet Union plan to deliver biological weapons?

For the Soviet Union, the main doctrine was to use biological weapons in so-called total wars involving possible mutual destruction between the United States and the Soviet Union and their allies. Delivery systems for operational biological weapons were mostly me-

dium-range bombers like the Ilyushin-28 fitted with a two-ton capacity spray tank, with the capability to cover 3,000 to 4,000 square kilometers of territory using just one plane. A squadron of medium-range bombers was located in the Volga region. These bombers carried 500-kilogram cluster bombs, each containing about 110 bomblets. From the late 1960s, single-warhead missiles for delivering biological weapons were developed and prepared for possible applications. Many facilities had special assembly lines for assembling bombs and warheads. In 1988, the decision was made to use multiple-warhead missiles for biological weapons. A single SS-18 intercontinental ballistic missile equipped with multiple warheads filled with a strategic biological agent would be sufficient to cover a city the size of New York, killing at least 50 percent of the population. More recently, heavy cruise missiles were developed for precise application of biological weapons.

Was the strategy to employ biological weapons after a nuclear exchange?

No, nothing like that. It was considered a strategic weapon that could be used together with nuclear weapons. Some targets would be struck by nuclear weapons, some by biological weapons, and some by both together.

What would be the effect of a strategic BW attack?

A strategic attack against a densely populated city using 50 kilograms of anthrax spores, which have a mortality rate of about 90 percent, could result in about 100,000 fatalities.

What was the logic of developing an agent like smallpox, which is so contagious that it could create a huge pandemic?

When we are talking about smallpox and plague biological weapons, these weapons would be used in the case of total war. When enemies started using nuclear weapons, no one would care about possible pandemics because it would be a war for mutual destruction. I am often asked why we developed genetically altered smallpox viruses when natural smallpox is bad enough. Unfortunately, it's a normal progression to develop more powerful weapons. Why, for example, did we develop a 100-megaton hydrogen bomb when both superpowers had 10-megaton and 20-megaton bombs? Now it seems absolutely senseless, but during the Cold War, we were

told all the time, "Guys, the United States is evil, they want to destroy our country. We need to do everything in our power to create very sophisticated and powerful weapons to protect our country."

You have alleged that the Soviet Union produced 20 tons of smallpox. Was that in dried form?

No dry smallpox weapon was developed, just one in liquid form.

How was the smallpox stored? If it was in liquid form, it would have to be refrigerated.

The Soviet military had very capable storage facilities. Two types of refrigerated storage tanks were used. The TR-50 stored 50 kilograms of agent and the TR-250 stored 250 kilograms. For smallpox and for plague there was a requirement for ongoing production because it wasn't possible to store the agent in liquid form for a long time—the liquid smallpox only had a shelf life of from half a year up to a year.

In wartime, the smallpox solution would have been taken from the storage tanks and filled into warheads and bombs?

It was quite a well-developed concept. Some supplies of smallpox, plague, and anthrax were already manufactured, stored, and stockpiled. Immediately after receiving an order it would take just two or three days to transfer these agents from the storage tanks into cluster bomblets and spray tanks. Each 500-kilogram cluster bomb contained more than 100 bomblets. The bombs would then be stored in refrigerated bunkers until use.

Were the BW cluster bomblets similar to other anti-personnel or anti-armor bomblets, or were they specially designed for BW application?

Because the American offensive BW program ended in 1969, you had a different concept and different delivery systems. The Soviet Union was able to develop a completely new approach to delivery of biological weapons. We developed small melon-shaped bomblets, which were packed into warheads and aerial bombs. It was a very interesting and well-developed concept, but I won't comment further because I don't want certain people to understand it very well.

Were the bomblets designed to explode at a certain altitude above the ground?

The bomblets were developed for dissemination of biological weapons at certain altitudes, such as 25 meters, 50 meters, 75 meters, 100 meters, sometimes up to 200 meters. The optimal altitude for release was between 25 and 100 meters.

Was there extensive testing of these devices?

Yes, of course. All of the BW agents we developed were tested in bomblets. We didn't test the bombs themselves because there was no need.

Was the testing done with experimental animals?

With monkeys.

How many facilities were included in the Biopreparat complex?

In 1989 to 1990, there were about 38 or 39 facilities, but not all of them were dedicated BW facilities. Biopreparat also did some legitimate work on pharmaceuticals, biotechnology, and vaccines. For example, the Institute of Applied Microbiology in Obolensk did 80 to 90 percent of its work on BW, but the Institute of Immunology did about 50 percent of its work on BW and 50 percent on civilian pharmaceutical needs. In many cases, developing pharmaceutical products provided a cover for secret BW activities.

What was the relationship between the Soviet Ministry of Defense (MOD)'s microbiological facilities and Biopreparat?

When Biopreparat was created in 1973, the main idea was to establish an entity that wouldn't have any "footprints" of previous BW activity in the Soviet Union [because, since the Soviet Union had signed the Biological Weapons Convention, it needed to hide this activity]. To avoid drawing attention to the link between Biopreparat and the 15th Directorate, communication only occurred at the headquarters level with no direct contact. As time went by, however, it became possible for small groups of Biopreparat scientists to visit the MOD facilities.

Was the military side doing the same thing as the civilian side?

In 1973 when Biopreparat was created, the government wanted the 15th Directorate to be a customer and

not to develop its own biological weapons. Biopreparat would be responsible for developing and manufacturing agents and creating mobilization capabilities, whereas the Ministry of Defense would be a client or a customer. The MOD was supposed to assign tasks, monitor what was being done at the Biopreparat facilities, conduct testing, and accept the new agents and munitions, much as the Pentagon is a customer of private companies. In reality, nothing like that happened. The MOD continued developing its own weapons in addition to these other functions. They worked on some of the same agents and weapons and sometimes on different ones. For example, we didn't develop Lassa fever biological weapon, but the MOD did.

What do you know about the 1979 anthrax outbreak in the Soviet city of Sverdlovsk?

Even today, the Russian military doesn't want to admit what was the real cause of this outbreak. In reality, it was an accident at an MOD microbiological facility in Sverdlovsk. A small amount of anthrax biological weapon went through the exhaust ventilation system and contaminated a large area downwind. Even now, we don't know the real number of dead people. According to some sources the number was 68, another group of people says 260, someone claims thousands. In 1983, one of my scientists who had been working at the Sverdlovsk facility in 1979 told me that the real number of dead people was 105. According to our calculations, the amount of anthrax released into the air was quite small, no more than 100 grams and perhaps less.

Was General Secretary Gorbachev fully briefed or was the BW program a compartmentalized activity within the Ministry of Defense?

It is certain that Gorbachev was briefed when he came to power [in 1985]. I also saw a document he signed—a five-year plan to develop new biological weapons for the years 1986 to 1990. He signed his name as M. Gorbachev, Secretary of the Central Committee of the CPSU—not General Secretary, because it's the Russian bureaucratic way to sign modestly. The five-year plan called for the creation of Ebola and Marburg biological weapons, intensification of the smallpox biological weapon effort, and the construction of new facilities. So you can imagine what he knew and what he did not. When somebody signs such a paper it's impossible not to understand.

Where were large quantities of BW agents produced?

Biopreparat was not responsible for manufacturing biological weapons in peacetime. Instead, it had a mobilization capacity for manufacturing BW agents in crisis or war. During the so-called “special period,” the period of tension or crisis before the outbreak of war, the Biopreparat facilities would receive an order to redirect their activity from civilian to military production. Each facility had a specially developed mobilization plan. For example, the Obolensk facility could manufacture plague, tularemia, and glanders (which replaced brucellosis).

From 1983 to 1987, I was the military commander of the Stepnogorsk production facility in Kazakhstan. If war had broken out, I would have directed the production of anthrax, plague, and tularemia biological weapons. We had specially developed plans for how many people would work at the facility and who would be responsible for agent production, for assembling bombs, and so forth. Stepnogorsk had a huge complex of bunker-type buildings and a railroad for bringing in the empty warheads and bomblets and for taking out the filled munitions. Special reinforced rooms were used for assembling and filling the bomblets, each of which had a detonator and an explosive charge. Other bunkers were used for assembling bombs and warheads. Ten days after receiving the order to redirect production, I would have to ship the first lot of bombs and warheads filled with anthrax.

In addition to the mobilization plan, three MOD facilities manufactured and stockpiled biological weapons in peacetime. Smallpox virus was produced at the Ministry of Defense facility at Zagorsk [now Sergiev Posad]. The MOD facility at Kirov stockpiled plague biological weapons. A third MOD facility at Sverdlovsk stockpiled anthrax biological weapons. An MOD facility at Reutov, near Moscow, stored submunitions for biological weapons. During a crisis, these facilities (except Reutov) would load biological agents from storage containers into delivery systems, and also continue agent production.

Were there many Soviet BW facilities outside of Russia and Kazakhstan? We’ve identified one such facility in Uzbekistan, the Institute of Genetics in Tashkent.

I’ve heard about this institute’s existence. This facility was under the Ministry of Agriculture and was responsible for doing some work in the area of anti-crop biological weapons development.

Did the Soviet Union ever use biological weapons?

When I became the first deputy director of Biopreparat in 1988, we had a series of meetings. I was told that the Soviet Union had employed a glanders biological weapon against the *mujahaddin* in remote locations in Afghanistan in 1982. Glanders, whose scientific name is *Pseudomonas mallei*, is lethal for horses and incapacitating for human beings. When I came to the United States, I discussed this issue with some US intelligence officials. They had information that some mysterious cases of infectious disease had been observed in Afghanistan during that period of time. The problem is that, without direct evidence, it’s very difficult to prove. I’ve already suggested to the US government that they organize an investigation into what actually happened in Afghanistan in 1982. It will never be possible to get this information out of Russia, but let’s try to analyze the situation from the other side. The political situation now in Afghanistan is difficult, but some of the victims are probably still alive.

Do you think there has been significant brain drain from the Soviet BW program to other countries?

Biopreparat had about 30,000 scientists, engineers, and technicians working on biological weapons. The 15th Directorate of the Ministry of Defense had about 15,000. The Ministry of Agriculture had about 10,000 people working on development and production of anti-crop and anti-livestock weapons. Several institutes of the Soviet Academy of Sciences employed hundreds of BW scientists. Others worked for the Ministry of Health, the Ministry of Industry, and other institutions. If you add up the total, there were about 60,000 to 70,000 people working in this area.

Since the breakup of the Soviet Union, however, many facilities have been downsized and others have stopped working in this area. More than 25 former Biopreparat scientists emigrated from the Soviet Union to the United States, and others are living in Europe. But nobody knows how many have gone to the Middle East, East Asia, or South Asia. Let me give you a couple of examples. In 1994 some BW scientists from the Ministry of Defense

visited North Korea, and the purpose of their visit is still unknown. In April 1998, one of the Russian newspapers reported that a Biopreparat scientist had visited the Chinese Embassy and tried to sell his knowledge of BW to the Chinese government.

Would it have been possible for weapons scientists who were working on the program to smuggle out seed cultures of BW agents, or was there high physical security around these facilities?

In many cases I don't think it is necessary to smuggle out agents. You can find these microorganisms in a lot of other places. But it's not a large problem to steal something. Back in 1984, when security at the MOD facilities was incredibly high, a military scientist working at Sverdlovsk created a new, genetically altered strain of tularemia. He was transferred to Obolensk, but he wanted to get a Ph.D. degree for his work. So he stole an ampoule of tularemia and brought it to Obolensk. Six months later he said, "Okay guys, I've developed a new strain" and applied for a Ph.D. Nobody was able to prove that he had stolen the strain but everyone understood that was the case, and it created a huge scandal.

Is Russia selling dual-use production equipment to proliferant states?

In 1995, the Russian government entered into negotiations with Iraq to sell some 5,000-liter fermentors. The person in charge of this negotiation from the Russian government was a former colonel and deputy chief of Biopreparat named Matveyev, who had been responsible for many Soviet BW facilities. The Iraqi government claimed they needed the fermentors to produce single-cell protein (SCP) from yeast as an animal-feed supplement. But I did not believe this explanation, because Matveyev did not know anything about manufacturing SCP. Moreover, to produce SCP economically, you have to make it in large fermentors with a capacity of 50 to 100 tons. In contrast, the 5,000-liter fermentor was developed by one of my institutes for a new production facility in Siberia—fortunately never built—for manufacturing plague biological weapons. So it was very suspicious. Maybe the Russian government understood that Iraq wanted to buy equipment and technology for manufacturing biological weapons and just didn't care. They wanted to make money. Fortunately, the deal never went through.

Do you believe that all of Russia's biological weapons were destroyed in the 1980s?

Let me say this. I've got no idea what was happening in Russia from 1994 to the present. But I believe all stocks of these weapons were destroyed.

How do you know that that is the case?

In 1989, I hired Colonel Shcherbakov, who had been working for the 15th Directorate, to become the head of one of the scientific departments in Biopreparat. He had been responsible for destruction of anthrax biological weapons in 1988 and 1989 on Vozrozhdeniye Island [the open-air BW test site in the Aral Sea]. Shcherbakov told me how they destroyed the weapons. They opened the containers of anthrax, put disinfectants inside, and closed them. A few days later they added more disinfectant. It was a long process. After they were sure that everything was dead, they removed the residue from the containers and buried it in large holes dug in the ground.

Is anything left at Vozrozhdeniye? Was that facility completely decontaminated?

The amount of anthrax destroyed was so huge that traces should remain. The 836 strain of anthrax in particular is extremely persistent. In 1989, I ordered the full decontamination of the Stepnogorsk facility using a mixture of formaldehyde and potassium permanganate. The decontamination took several months. Yet even after we had finished, it was possible to isolate viable anthrax spores from deep inside the walls and floors.

What changed your own mind about the Soviet BW program?

In the late 1980s, when Gorbachev was in the Kremlin and the political situation began to change, we started to understand that not everything we had been told was true. In 1989, I was chief scientist of the Biopreparat program and first deputy chief of its main directorate. One of my directors, who headed the Institute of Ultra-Pure Preparations in Leningrad [today St. Petersburg] defected to Great Britain. I gave him a permission to go to France and finally I realized he would never come back. Two or three months later, we started feeling strong pressure from the United States and Great Britain to tell what we were doing in the area of biological weapons. For me it was the first wake-up call, because why would these countries try to pressure the Soviet Union if they were doing similar work?

I held an intelligence briefing in the Kremlin and invited high-ranking intelligence officers from the KGB and the GRU [the main intelligence directorate of the Soviet Army] to provide a description of the US offensive BW program, including what types of facilities they had, what kind of weapons they had developed, who was in charge, and so forth. They couldn't give me an immediate answer. Two weeks later we met again and they told me they didn't have any information that could be considered reliable regarding the US offensive program. That was the second wake-up call.

Were you involved in the reciprocal visits to BW-related facilities?

Yes. Gorbachev finally agreed to a confidence-building program involving reciprocal visits to biological facilities in Great Britain, the United States, and the Soviet Union. The first US-British visiting team came to the Soviet Union in January 1991 and I was responsible for showing them some of our facilities. I organized visits to four of the Biopreparat research facilities because I assumed that if I showed them the production facilities everybody would be shocked. But when they saw the research facilities, they were unbelievably shocked. They realized that the Soviet capability in offensive BW could destroy any country several times over.

After that, we asked to visit four American facilities. Our intelligence services, the GRU and KGB, worked for a long period of time to determine which facilities to visit. They finally identified four: the US Army Medical Research Institute of Infectious Diseases at Fort Detrick; Pine Bluff arsenal near Little Rock, Arkansas; Dugway Proving Grounds in Utah; and the Salk Institute vaccine plant in Swiftwater, Pennsylvania. According to the Soviet intelligence services, these facilities were all involved in offensive BW activities.

Who was on the Soviet visiting team?

The team consisted of seven people from the Ministry of Defense including high-ranking officers, four people including myself from the main directorate of Biopreparat, a couple of spies, and two people from the Ministry of Foreign Affairs. The first place we visited was Fort Detrick. According to Soviet intelligence data, this was the head US facility for developing biological weapons. I was very suspicious and was trying to understand what kinds of activities were going on there. But I was struck by the openness of our American hosts. They

discussed absolutely everything. And because of my experience, I couldn't find any significant signs of offensive activity.

The next place we visited was Baker Laboratory at Dugway Proving Grounds, a large open-air test site located in the state of Utah. For many years some American citizens had been demonstrating in that area, saying that the United States was developing and testing biological weapons at the proving grounds. It was half true. But when we arrived in 1991, Baker Lab had been abandoned. Believe me, when you see dismantled test chambers, empty cages for animals, destroyed storage bunkers for explosives, and only civilian scientists at work, it raises very significant doubts. The next facility we visited was Pine Bluff arsenal, which had been built in the early 1950s and was assessed to be the main BW production site. But, when we visited the facility, it was abandoned.

Before we came to the United States, the Soviet Union's intelligence services had organized a special briefing. They showed us satellite pictures of Pine Bluff and gave us information on each building. We were told that the Arkansas facility was very active in manufacturing biological weapons. When I asked for evidence, they pointed to a location resembling a set of large containers that changed color several times during the day. In the morning they were blue, in the daytime red, and by the end of the day, yellow. The intelligence analysts concluded that Pine Bluff had such a huge and intensive production activity that they were changing containers three or four times a day.

What did you actually find when you got there?

When we arrived at Pine Bluff, one of our inspectors decided to investigate the colored containers. In reality, it was an array of solar collectors. When the panels moved during the day, they changed colors. Unfortunately for many members of the Soviet team, we couldn't find any evidence of offensive activities. We saw abandoned fermentors, dismantled equipment, and I even found a notepad dated 1973. It was of course very old in 1991.

What happened then?

When we left Moscow in December 1991 it had been the Soviet Union, but we returned to a completely new country, Russia. And we didn't know anymore which country we represented. When we got back to Moscow,

we were asked to prepare our personal reports. The military leadership wanted to convince President Yeltsin that the United States had an active BW program, so the military officers got instructions telling them to provide evidence in their reports to this effect. Unfortunately, the only person who refused was me. After that, of course, it was impossible to remain in the program. On January 13, 1992, I resigned my commission—at that time I was a colonel in the Russian Army—and a month later I left all my scientific and administrative positions.

And you then defected to the United States?

I don't like it when people say I defected, because in reality it was a different situation. There was a great deal of chaos in the former Soviet Union, which had just broken up, and because I am not a native Russian I decided to go back to my own country, Kazakhstan. But when I was invited by the Kazakh authorities to develop a biological weapons program, of course I had no choice but to leave. Today Kazakhstan is not interested in developing biological weapons, and I am very glad, but at that time several people in the government of Kazakhstan wanted to have such a program. Since I received an offer from the government of the United States, I decided to come to this country.

What evidence do you have that offensive BW work is continuing in Russia today?

I've discussed this issue with a lot of US scientists. I tell them, "Guys, read what's published." Some scientific publications coming out of Russia have a clear connection to offensive work, including efforts to develop so-called "chimeric" strains of viruses that could have completely novel effects. For example, Russian scientists published an article that said they were capable of inserting some genes of Ebola virus into vaccinia virus, which is a close cousin of the smallpox virus. One of the most prominent virologists in the United States claimed that what I was saying was sheer fantasy and technically impossible. But after I prepared a classified report for the US government describing what kind of biological weapons could be developed using the smallpox virus, this particular scientist stopped making his criticisms.

But vaccinia virus is routinely used to make vaccines.

Yes, but the genome of the smallpox virus, *Variola major*, is 95 percent homologous with the vaccinia vi-

rus. So if you are able to conduct some genetic engineering manipulations and insert some genes into the vaccinia virus, it is just a technical problem to do the same with smallpox. In 1988, we realized it wouldn't be possible in the future to work intensively with smallpox because of the political implications. Imagine this situation: the Soviet Ministry of Defense is continuing to work secretly with the smallpox virus and a terrible accident occurs in the Moscow region. Since smallpox had been eradicated worldwide by 1980, it would be difficult to explain to the international community why people in Moscow had come down with the disease.

So we developed a special program to determine what "model" viruses could be used instead of human smallpox. We tested vaccinia virus, mousepox virus, rabbitpox virus, and monkeypox virus as models for smallpox. The idea was that all research and development work would be conducted using these model viruses. Once we obtained a set of positive results, it would take just two weeks to conduct the same manipulations with smallpox virus and to stockpile the warfare agent. We would have in our arsenal a genetically altered smallpox virus that could replace the previous one. So everything was prepared for conducting further development work under strict observation from the international community.

And you found that animal pox viruses provided sufficiently close models for human smallpox?

Yes. When the Ministry of Defense realized that it wouldn't be possible in the future to work intensively with *Variola major*, they decided to start working with monkeypox virus, which infects humans but is much less contagious than smallpox. So the Ministry of Defense decided to work with monkeypox instead of smallpox to create future biological weapons.

When was this decision made?

In the late 1980s. And so when I now hear that the Russian MOD is working with monkeypox virus, how should I react? Everybody can try to convince me of something different, but I cannot believe it.

Would the object be to genetically engineer monkeypox to make it more contagious?

First, you could conduct genetic manipulations with the aim of making monkeypox virus as contagious as smallpox virus. This could be done by determining what parts of the viral genome are responsible for the conta-

giousness of this virus. In this case, of course, you would never be accused of working with smallpox.

Apparently the Russians have also conducted some expeditions to the Arctic to exhume bodies of smallpox victims, maybe 100 years old, buried in the permafrost.

(Laughs.) The head of the Vector facility responsible for developing smallpox biological weapons and myself were in on the beginning of the process [that led to this story, which is only a cover]. He was very anxious about how it would be possible to conduct research on smallpox in the future because of the global eradication program, the danger of working with smallpox, and the fact that we would be under close observation. He suggested that we could explain the necessity for working with smallpox virus because somebody had found some frozen corpses with smallpox scars on their faces. That would provide a good rationale for continuing to work with the smallpox virus. Imagine my reaction when I heard this again recently from the Russians, because I remember how we developed the cover story.

Perhaps with global warming the permafrost will melt and the bodies could come to the surface?

Theoretically it's possible, but I don't believe that you would find any corpse containing live virus after 100 years. It's true that if the smallpox virus is frozen under constant temperature, it can survive indefinitely. But in the Arctic, the temperature fluctuates so there are cycles of freezing and thawing. For this reason, the viral DNA would be very unlikely to survive for such a long period.

Does the Vector laboratory in Koltsovo (near Novosibirsk)—formerly part of the Biopreparat complex—intend to continue its research on pox viruses?

Yes, and it's very dangerous. Not because of Lev Sandakhchiev [the current director of Vector] but because of possible changes in the Russian government. When General Lebed was asked about the nuclear and biological capability of Russia, he replied that because the Russian Army is very weak, Russia needs these weapons to protect itself. So if General Lebed or somebody like him ever came to power, we would have a serious problem.

Now that the Cold War is over, why would Russia need to maintain an offensive BW potential?

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. Especially, in my opinion, for a country that is losing its conventional military potential and becoming weaker practically every single day.

If Russia continues to maintain an offensive BW program, what steps should be taken by the international community to encourage them to dismantle the program?

The main problem we need to solve is to force the Russians to open the four MOD microbiological facilities that are still top-secret and may be continuing to do offensive work.

How serious is the threat of biological terrorism?

I am not a psychic so I don't know if we'll have many cases of biological terrorism in the future. But if you're responsible for defense, you have to prepare for any plausible threat. You can't say after it happens, "Guys, we didn't know it was a real threat and that's why we didn't do anything." That's no answer because people are already dead. In this case, we need to understand that even if there is a small risk of biological terrorism, even less than one percent, we need to be prepared and to develop an adequate response.

A "biological Unabomber" working on his own might cause up to a few dozen deaths. But when we are talking about terrorist groups supported by so-called rogue countries, with advanced knowledge of BW, the threat could be much greater. If we start analyzing amounts of agents, means of delivery, place of application, and forms of terrorism, there's a wide spectrum of possible consequences. So when we are talking about developing defenses, we need to take into consideration this variety of possible situations.

In the event of a bioterrorist attack in this country, how long would it take a city like Monterey or San Francisco to know that something had indeed happened?

The US government is conducting training programs to prepare first responders to operate in foci of infection after the terrorist release of biological agents. But that's wrong-headed because you would never see any focus of infection. The first time you would know that something had been released is when you saw a huge influx of sick people into local hospitals. By analyzing where the victims were at a particular time and place, you might be able to determine in retrospect where and when the terrorist act had been committed. But by then the terrorists would have had enough time to escape from the point of release and even from the country.

When we discuss these topics we need to remember that each agent would cause a completely different clinical picture and epidemiology. When we see the characteristic symptoms of anthrax, it's usually too late to save the patient because survivability is only five or ten percent regardless of what kind of antibiotics or treatment regimen we use. With smallpox, we wouldn't see just one focus of infection but rather hundreds or even thousands of foci, because a person infected by a primary aerosol would start infecting other people by secondary aerosols. Today, our preparedness to respond to these types of situations is very low.

What can be done to protect the US population against biological attack?

The problem is that dozens of natural disease agents could be used as biological weapons, and if we add genetically engineered agents, hundreds. Many different means of delivery could also be employed. President Clinton has approved a program to develop several new vaccines for defensive purposes. But if there are 100 different possible agents, how would we determine what kind of weapon would be used by a terrorist? For this reason, the attempt to develop and stockpile new vaccines won't provide a significant advantage in biodefense.

It might seem that the situation is hopeless, but in fact it's not. What we need to do in the area of medical biodefense is to develop substances that boost the human body's immune system and provide broad-spectrum protection against all possible BW agents. It might

take three to five years, but if we start developing this type of non-specific biological defense, I believe it will eventually be possible to say that, for this country at least, biological weapons are no longer a threat.