

we must look beyond the program's financial solvency and address issues like quality, equity, and efficiency as well.

I ask unanimous consent that the text of my opening statement from the first commission meeting on March 6 be printed in the RECORD.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

OPENING STATEMENT BY SENATOR BREAUX,  
MEDICARE COMMISSION MEETING, MARCH 6,  
1998

I am very pleased to bring to order the first meeting of the National Bipartisan Commission on the Future of Medicare. I am honored to be chairing a group of such knowledgeable and well-respected people for the important task of making recommendations to preserve and improve the Medicare program. That doesn't mean looking at the program only in economic terms or in terms of solvency. It also means looking at the fundamental question of what we want Medicare to do and what kind of health care system we want for our elderly while addressing issues such as quality, equity, and efficiency.

I was appointed chairman of this commission 7 weeks ago today and in that time I have worked closely with Congressman Bill Thomas to establish an operational framework for the commission. I am pleased to be working with Congressman Thomas and I think that our working together testifies to the bipartisan nature of this commission. Let me say from the outset that I am firmly committed to having this whole group work together in a bipartisan, inclusive fashion. That is the only way we are going to have an end-product that enjoys widespread support in the Congress, in the Administration and across this nation.

I am also very pleased that one of the first orders of business was asking Bobby Jindal to serve as our Executive Director. He was an asset to Louisiana as Secretary of the Department of Health and Hospitals and I know he will be an asset to this Commission. Congressman Thomas will be introducing Bobby shortly.

I have said before that everything will be on the table. We shouldn't begin our work by excluding or endorsing any options. Every member of this commission should know that his or her views are going to be considered. The statute creating the commission requires 11 of 17 votes in order to issue a report so this is not going to be a report that is supported only by Democrats or Republicans. In fact, I don't think we will be truly successful unless we have agreement among an overwhelming majority of the commission members. As President Clinton said to the commission members yesterday, if there is not a consensus—don't let it be your fault.

The process we are suggesting for the work of the commission is designed to be inclusive and to build the consensus we need to be successful. The suggested task forces are designed to help gather information and develop a range of options for consideration by the full commission. Congressman Thomas and I sent out a survey to the membership about how to structure this process, including the task forces, and many of the comments and suggestions we received are reflected in the documents you have in front of you. You should look at these documents as a conceptual outline of the Commission's goals throughout the year. As we have stated—the timeline we have presented to you is designed to be a tool, not a work plan or a final product, to help focus the Commission's decision-making and to measure its progress. We may find that it is necessary to change

the agenda and have more meetings as we go through the year. We may also expand or delete topics depending on the Commission's interest.

No one would dispute that we have a very difficult task ahead of us. We have been charged by the Congress and the Administration with making recommendations on ways to preserve and improve the Medicare program. In order to do that, we must first come to an agreement on the scope of the problem facing Medicare. There will be some disagreement on this issue as there probably will be on most issues presented to the commission. But I am convinced that if we work together in a bipartisan way and lay all the facts and suggestions on the table, we can have a constructive debate on this issue.

We can't afford to let these issues be politicized any longer. There is just too much at stake for the health security of our senior citizens and the fiscal well-being of this country. We must put aside the old ways of dealing with Medicare—do away with "Medagoguery"—do away with the blame game where everyone scrambles to pin the blame for failure on the other party—do away with the shortsighted SOS approach which is woefully inadequate when you look at the demographic realities facing this program.

I believe that there is no greater challenge facing this country right now than how to preserve Medicare for future generations. While we added a few years to the life of the trust fund in last year's balanced budget agreement, we did nothing to prepare for the 77 million baby boomers who will depend upon Medicare for their health care beginning in 2010.

In the context of overall entitlement reform, how to go about fixing Medicare is very complex. Unlike Social Security, which promises specific levels of income, Medicare promises specific health benefits which are susceptible to volatile increases in medical inflation and the high cost of advances in medical technology. Part of the problem with getting a handle on the scope of the problem is the unpredictability in estimates regarding such things as health spending and economic growth. But the demographic realities will not change.

We all know how politically sensitive the issue of Medicare is. That is why the Congress and the Administration created this Commission—to make the tough recommendations for fixing the program and to make it easier for elected officials to take the tough political step of enacting these recommendations into law.

For most of the things we do in Congress, the most important objective is to craft legislation that can pass. There are some people who would rather stand for what they believe is the ideal solution and never compromise, even if that means nothing gets done. The primary objective of this Commission should be to come up with the best proposal possible and then worry about how we're going to get it passed by the Congress and signed into law by the President.

Let me assure my fellow commission members that my previous positions and efforts on Medicare are not going to dictate this Commission's agenda. I hope you all make the same commitment.

I know there has been a lot of attention given recently to the issue of expanding Medicare and allowing certain groups to "buy in" early. First, let me reiterate that this commission has been specifically charged by statute with making "recommendations on modifying age-based eligibility to correspond to changes in age-based eligibility under the OASDI (Social Security) program and on the feasibility of allowing individuals between the age of 62 and the

Medicare eligibility age to buy into the Medicare program." This language is explicit and this Commission will be thoroughly exploring this idea. As I've said several times in the past few months, I think that Congress will let the Commission do its work and study the impact of this policy on the Medicare program before moving ahead in Congress. However, having said that, I certainly wouldn't oppose legislation if it is offered and if it is the will of this Congress to move forward with legislation of this nature. There are an estimated 41 million uninsured people in this country and that is a serious problem that affects everyone—not just those who don't have insurance. Any efforts to decrease the number of uninsured people in this country (such as the children's health bill last year) should be given careful consideration.

We have a huge challenge of trying to help educate the American people about the seriousness of the problems facing Medicare but we must realize that nothing is going to pass the Congress and signed into law that doesn't enjoy their support.

I am hopeful that the Congress and the Administration will act on whatever recommendations this commission puts forward. We as elected officials have a responsibility to future generations to fix this program so that our children and grandchildren can enjoy the same guarantee of health insurance that their parents did. I don't want the report of this Commission to simply gather dust on a library shelf.

Let me close by saying that I am optimistic. I know there are a lot of people "inside the Beltway" who think that this issue is too politically sensitive to inspire meaningful debate. That it is unrealistic to think that such a diverse group of people representing such a wide range of opinion can reach a consensus. But I believe that this Commission faces a unique and critical opportunity that cannot be squandered. Medicare has been a success for 33 years and is a vital part of our national fabric. We have an obligation to ensure that the success of this program continues for the next 33 years and beyond. Our parents and grandparents have reaped the benefits of health security afforded by Medicare since 1965—our children and grandchildren deserve no less. If we make this a truly bipartisan process, hear from everyone who has a stake in preserving this program for future generations, and focus on our similarities and not our differences, we will succeed.

#### RUSSIAN BW PROGRAM

Mr. KYL. Mr President, I call to the attention of my colleagues an article appearing in the March 9 edition of The New Yorker magazine that offers a chilling account of Russia's offensive biological weapons program. This article is based on an extensive interview with Mr. Ken Alibek, a Russian defector who was once second in command of the Russian offensive biological weapons program. Alibek's description of the Russian BW program is generally considered authoritative by a wide range of U.S. experts.

The article provides a number of startling details about the Russian offensive BW program, also known as Biopreparat. Most startling of all is just how little we in the United States knew about this program. Despite the fact that Biopreparat was established in 1973—the year after the Soviet

Union signed the 1972 Biological Weapons Convention and pledged to forego an offensive BW program—and despite intelligence to the contrary, some in the U.S. scientific and arms control communities continued to maintain that Russia was not violating the treaty up to the moment that President Yeltsin admitted otherwise in 1992.

Mr. President, what the Russians had accomplished by 1991 is frightening. According to Alibek, the Soviet Union had warheads for carrying biological weapons on intercontinental missiles that were aimed at the United States. These warheads could carry smallpox, plague and anthrax. The Soviets had apparently weaponized the Marburg virus—a hemorrhagic virus as gruesome as the Ebola virus—and were ready to begin large scale manufacture of the weapon as the Soviet Union was crumbling apart. Alibek is concerned that scientists may have left Russia with samples of this virus and other deadly bacteria. The possibility that Russian scientists, know-how and biological materials are available to rogue states and terrorists underscores the critical importance of improving our domestic preparedness to respond to BW attacks against the United States.

We do not know the extent of the Russian biological weapons program today. There is evidence to suggest that a clandestine program continues, hidden away in military facilities run by the Ministry of Defense, which are off-limits to the West. The trilateral process, which was set up by the United States, United Kingdom, and Russia in 1992 and calls for inspections of Russian biological-related facilities, has broken down. It has been years since an inspection took place. The Russians have objected to visits to military facilities. And where inspections occurred, the inspectors faced the same obstacles as U.N. inspectors face in Iraq.

Mr. President, The New Yorker article should be required reading for all Senators. I ask unanimous consent that this article be printed in the RECORD. I understand from the Government Printing Office that it will cost approximately \$2504 to include this article in the RECORD.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

[From the New Yorker, Mar. 9, 1998]

ANNALS OF WARFARE—THE BIOWEAPONEERS  
IN THE LAST FEW YEARS, RUSSIAN SCIENTISTS  
HAVE INVENTED THE WORLD'S DEADLIEST  
PLAGUES. HAVE WE LEARNED ABOUT THIS TOO  
LATE TO STOP IT?

(By Richard Preston)

Ken Alibek is a quiet man, forty-seven years old, with youthful looks and an attractive, open face. He lives in a rented condominium in Arlington, Virginia, a five-minute walk from his office at a private consulting firm. Alibek has dark hair and Asian features, and a dimpled scar on his nose, which he got in an accident that was "not heroic," he says, involving a machine in a biowarfare plant.

Before he arrived in the United States, in 1992, Ken Alibek was Dr. Kanatjan Alibekov,

the first deputy chief of research and production for the Soviet biological-weapons program. He was the top scientist in the program, a sprawling, clandestine enterprise known as Biopreparat, or The System, by the scientists who worked in it. Biopreparat research-and-production facilities were flung all across the Soviet Union. As Dr. Alibekov, Ken Alibek had thirty-two thousand scientists and staff people working under him.

Alibek has a Doctor of Sciences degree in anthrax. It is a kind of super-degree, which he received in 1988, at the age of thirty-seven, for directing the research team that developed the Soviet Union's most powerful weapons-grade anthrax. He did this research as head of the Stepnagorsk bioweapons facility, in what is now Kazakhstan, which was once the largest biowarfare production facility in the world. The Alibekov anthrax became fully operational in 1989. It is an amber-gray powder, finer than bath talc, with smooth, creamy particles that tend to fly apart and vanish in the air, becoming invisible and drifting for miles. The Alibekov anthrax is four times more efficient than the standard product.

Ken Alibek is part of a diaspora of biologists who came out of Russia following the breakup of the Soviet Union. Government funding for research decreased dramatically, and scientists who were working in the biowarfare program found themselves without jobs. Some of them went looking abroad. A few have come to the United States or Great Britain, but most went elsewhere. "No one knows where they are," Alibek says. One can guess that they've ended up in Iraq, Syria, Libya, China, Iran, perhaps Israel, perhaps India—but no one really knows, probably not even the Russian government. No doubt some of these biologists have carried the Alibekov formula in their heads, if not master seed strains of the anthrax and samples of the finished product in containers. The Alibekov anthrax may be one of the more common bioweapons in the world today. It seems plausible that Iraqi biologists, for instance, know the Alibekov formula by now.

One day, Ken Alibek and I were sitting in a conference room near his office talking about the anthrax he and his research team had developed. "It's very difficult to say if I felt a sense of excitement over this. It's very difficult to say what I felt like," he said. "It wouldn't be true to say that I thought I was doing something wrong. I thought I had done something very important. The anthrax was one of my scientific results—my personal result."

I asked him if he'd tell me the formula for his anthrax.

"I can't say this," he answered.

"I won't publish it. I'm just curious," I said.

"Look, you must understand, this is unbelievably serious. You can't publish this formula," he said. When I assured him I wouldn't, he told me the formula for the Alibekov anthrax. He uttered just one sentence. The Alibekov anthrax is simple, and the formula is somewhat surprising, not quite what you'd expect. Two unrelated materials are mixed with pure powdered anthrax spores. It took a lot of research and testing to get the trick right, and Alibek must have driven his research group hard and skillfully to arrive at it. "There are many countries that would like to know how to do this," he said.

Until last week, when Ken Alibek was interviewed on "PrimeTime Live," he was known in this country only to a few government officials and intelligence experts and defense-industry figures. What he told the C.I.A. and other people with national-security clearances was usually classified. Sometimes the information was so secret that

even he couldn't look at his reports once they were issued. "The first report I wrote, I only saw it once from across a room. It was sitting on a table. They wouldn't let me go any closer to it," Alibek says, with a tiny smile.

What Alibek describes is shocking, even to those who thought they had a pretty good idea of what bioweapons are out there and who has them. But it is particularly timely now that the public's attention has suddenly focused on the possibility of biological terrorism, which gained a peculiar intensity in late February, when Larry Wayne Harris and William Leavitt, Jr., were arrested by the F.B.I. outside Las Vegas with what was thought to be weapons-grade anthrax in the trunk of a car. The repeated news reports—which turned out to be a false alarm—that they were planning a terrorist attack on the New York City subway system clarified what had seemed to be a vague threat hidden in Iraq. Bioterror had come home.

I first heard about Ken Alibek in 1995, although at that time none of my contacts would tell me his name. He was referred to only as No. 2. (Biodefector No. 1 had come out in 1989.) Last fall, when I finally figured out that No. 2 was Alibekov, I called up a source who has connections to British intelligence and told him I thought I knew who No. 2 was. He cut me off. "Don't say a name," he said. "I can't confirm anything. Have you forgotten that we are talking on a open telephone line?" That source went nowhere, but then I had an idea. For several years, I have known a man named William C. Patrick III, who in certain important respects is the leading American expert on biological weapons. Before 1969, when President Richard Nixon shut down the American biowarfare program, Bill Patrick was the chief of product development for the United States Army's biological-warfare laboratories at Fort Detrick, Maryland. The "products" that Patrick and his research group developed were powdered spores and viruses that were loaded into bombs and sophisticated delivery systems. Patrick was arguably the top bioweaponeer in the United States. He and several hundred other scientists and research-staff members lost their jobs when the biowarfare facilities at Fort Detrick were closed down. (Today, to the best of my knowledge, the scientists at the United States Army Medical Research Institute of Infectious Diseases, or USAMRIID, at Fort Detrick don't make offensive bioweapons. They develop vaccines and treatments to defend against them. As far as I can tell, the United States has no bioweapons, and one piece of evidence for this is that government officials today are remarkably ignorant of them.)

Bill Patrick, who is now seventy-one years old, is one of only two or three scientists still alive and active in the United States who have a hands-on technical understanding of bioweapons. As he explained to me, "There's a hell of a disconnect between us fossils who know about biological weapons and the younger generation." In 1991, on the eve of the Gulf War, he was summoned to the Pentagon to take part in a discussion of anthrax. Patrick sat in silence while a group of intelligence analysts, young men and women dressed in suits, discussed anthrax in knowledgeable-sounding voices. "I reached the conclusion that these people didn't know what the hell they were talking about," Patrick recalls. He said, "Have any of you fellows actually seen anthrax?" and he reached into his pocket and pulled out a small jar of amber-brown powder, and hucked it across the table. It rattled and bounced toward the analysts. They jerked away, some leaping to their feet. The jar contained anthrax simulants, a biopowder that is essentially

identical to anthrax except that it doesn't kill. It is used for experiments in which properties other than infectivity are being tested. "I got that through security, by the way," Patrick observed.

Later, Bill Patrick was the oldest United Nations weapons inspector in Iraq. The Iraqis knew exactly who he was—the former top scientist in the former American bio-weapons program. Iraqi intelligence people started calling his hotel room in Baghdad at night, hissing, "You son of bitch, Patrick," and then hanging up. "It was kind of an honor, but it kept me awake," he says.

Today, Bill Patrick is a consultant to many government agencies—the C.I.A., the F.B.I., the Defense Intelligence Agency, the City of New York—on the use of biological weapons in a terrorist attack. Jerome Hauer, who is the head of Mayor Rudolph Giuliani's Office of Emergency Management—the group that would handle a bioterror event in New York, should one ever happen—said to me once, "Bill Patrick is one of the only guys who can tell us about some of these biological agents. We all wonder what we're going to do when he decides to light up a cigar and go sailing." Patrick is able to tell emergency planners what will happen if a biological weapon is released in an American city—how many people will die, where they'll die, what the deaths will look like. His reports are classified.

Bill Patrick and Ken Alibek were counterparts. They had been two of the top scientists in what had been the best bio warfare programs on the planet. I speculated that Patrick might know Alibek.

"Do I know Ken?" Patrick boomed over the telephone. "We're close friends! My wife and I had Ken over for Christmas this year with our family, because we think he's kind of lonely."

Then I thought I understood: Patrick must have participated in the long government discussions with Alibek—the debriefing—that would have taken place after his arrival in the United States. No one else in the U.S. government, not a single soul, would have understood so clearly what Alibek was talking about. The two scientists had become friends during the process.

I drove down to Bill Patrick's house in Maryland, on a misty day in winter, when leafless white-oak trees and poplars lay in a haze across the slopes of Catoctin Mountain. The clouds pulled apart and the sun appeared, gleaming through cirrus like a nickel. Patrick's house is a modern version of a Swiss chalet, with a view of Fort Detrick and rolling countryside.

"Come in, young man," Patrick said genially. A small dog was yapping around his feet. Patrick has a gentlemanly manner, a rather blocky face, with hair combed over a bald head, and penetrating greenish eyes. He glanced at the sky and seemed to sniff the air before ushering me into the house. He is exquisitely sensitive to weather.

Alibek arrived a short while later, driving a silver BMW. After lunch, we settled down around the kitchen table. Patrick brought out a bottle of Glenmorangie Scotch whiskey, and we poured ourselves a round. It seemed a very Russian thing to do. The whiskey was smoky and golden, and it moved the talk forward.

"You know, I'm disappointed the agency didn't do better by you, Ken," Patrick remarked. He turned to me. "They let him sign up for all these credit cards."

Alibek smiled wryly. "This was a problem." The C.I.A. had introduced him to Visa. "I could buy things with the cards, but it didn't seem like money. Then I found out you have to pay for it later."

Alibek speaks English with a mild Russian accent that makes his serious manner seem

almost gloomy. He often has a cigarette smoldering between his fingertips, but he works out at a health club, and he has broad, firm shoulders. His brown eyes seem sombre, and he wears black wire-rimmed eyeglasses. He favors linen shirts with band collars, and soft wool-piqué jackets in dark, muted colors. He has a calm expression, with a downward-glancing gaze, and he looks vaguely Chinese. Ethnically, he is a Kazakh. He was born and raised in Kazakhstan. In Russia, he was twenty-five pounds heavier, really quite stout, but he says that he is a different person now, even physically.

I asked Alibek how he feels about living here. "I'm happy I'm not doing the work," he said. He paused. "I'm not one hundred percent happy. I know how people feel about me in Russia. Some of my scientific colleagues feel I am a betrayer." Alibek keeps his emotions well hidden, perhaps even from himself. He does not laugh easily. When he does laugh, he is clearly enjoying himself, but his body is slightly rigid. He quit Biopreparat in 1991, left Russia with his family, and abruptly ended up in the United States. According to Alibek, some of his former colleagues at Biopreparat—which was privatized—sent word through intermediaries that "if you ever come to Russia you can expect some problems."

"I've got no desire to go to Russia," Alibek said, shrugging. He recently separated from his wife, although they enjoy a cordial relationship. She lives near him with their two boys, whom he sees almost every day. His oldest child, a daughter, is studying architecture at an Ivy League university. At times, Alibek has suffered from loneliness and a sense of dislocation, and he has had some concerns about how he will support his wife and children in the United States. The Alibeks had a privileged life in Russia, with drivers to take them everywhere and all the money they could use. The United States Government paid him consulting fees while he was briefing scientists and officials, but now he is on his own.

Ken Alibek was raised in Alma-Ata, then the capital of Kazakhstan. Alma-Ata is in central Asia, not far from the Chinese border, on the medieval silk route. His first language was Kazakh, and he learned Russian at school. He got a medical degree at the military medical institute at Tomsk. His special interest was infectious-disease epidemiology. At some point while he was still in medical school, he was chosen to work for Biopreparat. Since it was a secret system, you didn't really apply; you were approached and brought in. He rose fast. In 1982, at the age of thirty-one, he became the acting director of the Omutninsk bioweapons-production plant, a major facility in the Kirov region of Russia. Eventually, he ended up working in Biopreparat's headquarters, a large building in Moscow—the same building where Biopreparat is situated today.

In early April of 1988, Ken Alibek received a telephone call in his office in Moscow. It came from his friend and colleague Lev Sandakhchiev, the director of a Biopreparat facility called Vector, a huge, isolated virology-research campus in the larch forests outside Novosibirsk, a city in western Siberia. In the late nineteen-eighties, Vector was devoted largely to the development and production of virus weapons (Dr. Sandakhchiev denies this.) Dr. Sandakhchiev reported that there had been an accident. He was reluctant to discuss it on the telephone.

"Send me the details in a cryptogram," Alibek said. Once a day for the next fourteen days, Alibek received a new cryptogram about the victim of the accident, Dr. Nikolai Ustinov.

Dr. Ustinov was forty-four years old. Alibek recalls him as a fair-skinned man

with light-brown hair, ethnically a Russian. He had a wife and children. Alibek thought of him as a good guy and a talented scientist, easy to talk with, receptive to new ideas. Ustinov had been doing basic military research on the Marburg virus, studying its potential as a weapon. The long-term goal was to see if it could be loaded into special biological warheads on the MIRV missiles that were aimed at the United States. (A MIRV has multiple warheads, which are directed at different targets.) At the time, the Soviet biological missile warheads were designed to be loaded with strategic/operational smallpox virus, Black Death, and anthrax. The Marburg virus had potential for weaponization, too. Marburg is a close cousin to the Ebola virus, and is extremely lethal. Dr. Ustinov had been wearing a spacesuit in a Level 4 hot lab, injecting guinea pigs with Marburg virus. He pricked himself in the finger with a needle, and it penetrated two layers of rubber globes.

Nikolai Ustinov exited through an air lock and a chemical decon shower to Level 3, and used an emergency telephone to call his supervisor. The supervisor decided to put Ustinov into a biocontainment hospital, a twenty-bed unit with steel air-lock doors, like the doors of a submarine, where nurses and doctors wearing spacesuits could monitor him. He was not allowed to speak with his wife and children. Ustinov did not seem to be afraid of dying, but, separated from his family, he became deeply depressed.

On about the fourth day, Ustinov developed a headache, and his eyes turned red. Tiny hemorrhages were occurring in them. He requested a laboratory notebook, and he began writing a diary in it, every day. He was a scientist, and he was determined to explain how he was dying. What does it feel like to die of Marburg virus? What are the psychological effects? For a while, he maintained a small hope that he wouldn't die, but when his skin developed spontaneous bruises he understood what the future held. Dr. Sandakhchiev's cryptograms to Alibek were dry and factual, and didn't include the human details. Alibek would later learn that perhaps twice Ustinov had broken down and wept.

Alibek was frantic to get help to Ustinov. He begged the Ministry of Defense for a special immune serum, but bureaucratic delays prevented its arrival in Siberia until it was too late. When Ustinov began to vomit blood and pass bloody black diarrhea, the doctor gave him transfusions, but as they put the blood into him it came out of his mouth and rectum. Ustinov was in prostration. They debated replacing all the blood in his body with fresh new blood—a so-called whole-body transfusion. They were afraid that that might trigger a total flooding hemorrhage, which would kill him, so they didn't do it.

Alibek did not know exactly which strain of Marburg had infected his colleague. It had been obtained by Soviet intelligence somewhere, but the scientists were never told where strains came from. The Marburg virus seems to live in an unknown animal host in East Africa. It has been associated with Kitum Cave, near Mt. Elgon, so the Soviet strain could have been obtained around there, but Alibek suspected that it came from Germany. In 1967, the virus had broken out at a vaccine factory in Marburg, a small city in central Germany, and had killed a number of people who were working with monkeys that were being used to produce vaccine. One of the survivors was a man named Popp, and Alibek thought that Ustinov was probably dying of the strain that had come from him.

I have seen a photograph of a Marburg monkey worker taken shortly before his death, in late summer, 1967. He is a stout

man, lying on a hospital bed without a shirt. His mouth is slack, his teeth are covered with blood. He is hemorrhaging from the mouth and nose. The blood has run down his neck and pooled in the hollow of his throat. It looks spidery, because it's unable to clot. He also seems to be leaking blood from his nipples.

The final pages of Dr. Nikolai Ustinov's scientific journal are smeared with unclotted blood. His skin developed starlike hemorrhages in the underlayer. Incredibly—the Vector scientists had never seen this—he sweated blood directly from the pores of his skin, and left bloody fingerprints on the pages of his diary. He wept again before he died.

Ken Alibek is nearly hypnotic when he speaks of these things in his flat voice. We sat around the kitchen table as if we were old friends sharing a story. A gray light shone through the kitchen window, and I saw the red flash of a cardinal near the Patricks' bird feeder, almost a flicker of blood. The dog noticed a squirrel, and started barking. "Go get him, Billy," Patrick said, rising to let the dog out.

Dr. Ustinov died on April 30, 1988. An autopsy was performed in the spacesuit morgue of the biocontainment hospital. If this was indeed the Popp strain of Marburg virus—and who could say?—it was incredibly lethal. It produced effects in the human body that were stunning, terrifying. Alibek says that a pathology team removed Ustinov's liver and his spleen. They sucked a quantity of his destroyed blood out of a leg vein using large syringes.

They froze the blood and the body parts. They kept the Ustinov strain alive and continually replicating in the laboratories at Vector. They named the strain Variant U, after Ustinov, and they learned how to mass-produce it in simple bioreactors, flasks used for growing viruses. They dried Variant U, and processed it into an inhalable dust. The particles of Variant U were coated to protect them in the air so that they would drift for many miles.

In late 1990, Biopreparat researchers tested airborne Variant U on monkeys and other small animals in special explosion-test chambers at the Stepnagorsk plant. Marburg Variant U proved to be extremely potent in airborne form. They found that just one to five microscopic particles of Variant U lodged in the lungs of a monkey were almost guaranteed to make the animal crash, bleed, and die. With normal weapons-grade anthrax, in comparison, it takes about eight thousand spores lodged in the lungs to pretty much guarantee infection and death.

Alibek said that by the fall of 1991, just before Boris Yeltsin came to power, Marburg Variant U was on the verge of becoming a strategic/operational biological weapon, ready to be manufactured in large quantities and loaded into warheads on MIRVs. These warheads are sinister things. Ten separate cone-shaped warheads, each targeted on a different location, sit atop a missile. Special cooling systems inside each warhead keep the virus alive during the heat of reentry through the earth's atmosphere. "If we can land a cosmonaut to earth alive, we can do the same with a virus," Alibek explained. "We use parachutes." The biowarheads are parachuted over a city, and at a certain altitude they break apart. Out of each warhead bursts a spray of more than a hundred oval bomblets the size of small cantaloupes. The cantaloupes fly out a distance and then split in overlapping patterns, releasing a haze of bioparticles that quickly becomes invisible.

Variant U never became part of the Soviets' strategic arsenal, which was stocked with Black Death, Alibekov anthrax, and powdered smallpox. (Never less than twenty

tons of weapons-grade dry smallpox was stockpiled in bunkers.) But it seems quite possible that when the Russian biowarfare facilities fell on hard times and biologists began leaving Russia to work in other countries, some of them carried freeze-dried Variant U with them, ready for further experimentation. Variant U started, perhaps, with a monkey worker named Popp, but its end in the human species is yet to be seen.

A generation ago, biological weapons were called germ-warfare weapons. Biological weapons are very different from chemical weapons. A chemical weapon is a poison that kills upon contact with the skin. Bioweapons are microorganisms, bacteria or viruses, that invade the body, multiply inside it, and destroy it. Bioweapons can be used as strategic weapons. That is, they are incredibly powerful and dangerous. They can kill huge numbers of people if they are used properly, and their effects are not limited to one place or a small target. Chemical weapons, on the other hand, can be used only tactically. It is virtually impossible to put enough of a chemical in the air in a high enough concentration to wipe out a large number of people over a large territory. And chemicals aren't alive and can't spread through an infectious process.

There are two basic types of biological weapons, those that are contagious and those that are not. Anthrax is not contagious: people don't spread it among themselves; you can't catch anthrax from someone who is dying of it. Smallpox is contagious. It spreads rapidly, magnifying itself, causing mortality and chaos on a large scale.

Like any weapon, a biological weapon can be released accidentally, but when a biological accident happens, the consequences can be particularly insidious. I talked about this with Ken Alibek that day in Bill Patrick's kitchen, while we drank whiskey in the soft light of a winter afternoon. Alibek spoke about how bioweapons have a disturbing tendency to invade nonhuman populations of living creatures—thus finding a new niche in the ecosystems of the earth, apart from the human species. When he was the acting director of the biowarfare facility at Omutninsk, his safety officers discovered that wild rodents living in the woods outside the factory had become chronically infected with the Schu-4 military strain of tularemia—a bacterium that causes a type of pneumonia—which was being made in the plant. It was a hot, lethal strain that came from the United States: an American biological weapon that the Soviets had managed to obtain during the nineteen-fifties. Now, unexpectedly, the wild rodents were spreading Schu-4 among themselves in the forests around Omutninsk. The rodents were not the natural host of tularemia, but it had apparently established itself in them as new hosts. People catch tularemia easily from rodents, and it can be fatal. Alibek mounted an investigation and found that a pipe running through a basement area had a small leak and was dripping a suspension of tularemia cells into the ground. The rodents may have come in contact with the contaminated soil in that one spot.

The staff tried to sterilize the frost of rodents near the plant. That didn't work, because rodents are impossible to eradicate. "We could not get rid of the rodents. We tried everything," Alibek said. "Nobody knows today, but we can assume that the tularemia is still there in the rodents." Nobody knows if anyone has died of the American-Russian tularemia around the Kirov region.

"Could it have spread across Russia in rodents?" I asked.

"This I don't know."

Biopreparat, or The System, was set up in 1973, just a year after the Soviet Union

signed the Biological and Toxin Weapons Convention, an agreement banning the development, use, and stockpiling of biological weapons. The United States, which had ended its offensive-bioweapons program in 1969, also signed the treaty, as did Great Britain. (Some hundred and forty nations have signed the convention by now.) The Soviets continued to believe, however, that the United States had not ended its bioweapons program but simply hidden it away, turning it into a "black" weapons program. "The notion that the Americans had given up their biological weapons was thought of as the great American lie," a British intelligence officer recalls. "In fact, most of the Biopreparat scientists had never even heard of the Biological Weapons Convention."

Biopreparat consisted of some forty research-and-production facilities. About a dozen of them were enormous. Perhaps half of the employees developed weapons and the other half made medicines. Biopreparat worked both sides of the street: it cured diseases and invented new ones. An island in the Aral Sea, curiously named Rebirth Island, was used for open-air weapons testing. Large numbers of animals, and perhaps some humans, died there. Biopreparat was modelled to some extent on the Manhattan Project, the program that led to the first atomic bomb. Military people administered the program and scientists did the research-and-development work.

Somehow, Biopreparat's weapons program remained invisible to the American scientific community. There was a commonly held belief among many American scientists, supported by the strong, even passionate views of a handful of experts in biological weapons, that the Soviet Union was not violating the treaty. This view persisted, despite reports to the contrary from intelligence agencies, which were often viewed as being driven by right-wing ideology.

One of the side effects of the closing of the American bioweapons program was that the United States lost its technical understanding of biological weapons. There has long been a general feeling among American scientists—it's hard to say just how widespread it is, but it is definitely there—that biological weapons don't work. They are said to be uncontrollable, liable to infect their users, or unworkable in any practical sense. A generation ago, leading physicists in this country understood nuclear weapons because they had built them, and they had observed their effects in field tests and in war. The current generation of American molecular biologists has been spared the agony of having created weapons of mass destruction, but, since these biologists haven't built them, or tested them, they don't know much about their real performance characteristics.

Sitting in Bill Patrick's kitchen, I said to Alibek, "There seems to be a common belief among American scientists that biological weapons aren't effective as weapons. You see these views quoted occasionally in newspapers and magazines."

Alibek looked disturbed, then annoyed. "You test them to find out. You learn how to make them work," he said to me. "I had a meeting yesterday at a defense agency. They knew absolutely nothing about biological weapons. They want to develop protection against them, but all their expertise is in nuclear weapons. I can say I don't believe that nuclear weapons work. Nuclear weapons destroy everything. Biological weapons are more . . . beneficial. They don't destroy buildings, they only destroy vital activity."

"Vital activity?"

"People," he said.

The first defector to emerge from Biopreparat was Vladimir Pasechnik, a microbiologist, who arrived in Great Britain

in 1989, just as the Soviet Union was beginning to crumble. (He was No. 1 to Alibek's No. 2.) Pasechnik frightened British intelligence, and later the C.I.A., when he told them that his work as director of the Institute of Ultra-pure Biopreparations, in Leningrad, had involved offensive-biowarfare research into *Yersinia pestis*, a pestilential microbe that causes plague, or Black Death—an airborne contagious bacterial organism that wiped out a third of the population of Europe around the year 1348. Natural plague is curable with antibiotics. After listening to Dr. Pasechnik, the British concluded that the Soviet Union had developed a genetically engineered strain of plague that was resistant to antibiotics. Because the Black Death can travel through the air in a cough from person to person, a strain of multi-drug-resistant Black Death might be able to amplify itself through a human population in ever-widening chains of infection, culminating in a biological crown fire in the human species. No nuclear weapon could do that. What was the Soviet Union doing developing strategic contagious biological weapons? "I couldn't sleep at night, thinking about what we were doing," Pasechnik told his British handlers. Even though Western intelligence agencies had known that the Russians had a bioweapons program, they had not known what was being developed, and that the United States was a so-called deep target, far enough away so that the Soviet Union wouldn't be contaminated.

President George Bush and Prime Minister Margaret Thatcher were briefed on Pasechnik's revelations, and they put direct personal pressure on Mikhail Gorbachev to open up the biowarfare facilities in the U.S.S.R. to a team of outside inspectors. Eventually, he agreed, and a joint British-American weapons-inspection team toured four of the main Biopreparat facilities in January, 1991. The inspectors visited Vector (the virology complex outside Novosibirsk, where Ustinov died) and a giant, high-security facility south of Moscow called the State Research Center for Applied Microbiology at Obolensk, where they found fermenter tanks—forty of them, each two stories tall. They were maintained at Biosafety Level 4, inside huge ring-shaped biocontainment zones, in a building called Corpus One. The facility was dedicated to research on a variety of bacterial microbes, especially *Yersinia pestis*. The Level 4 production tanks were obviously intended for making enormous quantities of something deadly, but when the inspectors arrived the tanks were sparkling clean and sterile.

As the British and American weapons inspectors toured the Biopreparat facilities, they ran into the same problems that recently faced the United Nations Special Commission inspectors in Iraq. They were met with denials, evasions, and large rooms that had been stripped of equipment and cleaned up. A British inspector said to me, "This was clearly the most successful biological-weapons program on earth. These people just sat there and lied to us, and lied, and lied."

The deal was that after the Americans and the British had peeked at Biopreparat a team of Soviet inspectors was to visit the United States. In December, 1991, Ken Alibek and a number of leading Biopreparat scientists and military people visited USAMRIID, at Fort Detrick, the Army's Dugway Proving Ground, in Utah, and the Army's old bioweapons-production facility in Pine Bluff, Arkansas, which had been abandoned and partly dismantled in 1969. The Russians stumbled around the weeds in Pine Bluff and saw rusting railroad tracks, buildings with their roofs falling in, and nothing that worked. Alibek was pretty well con-

vinced by the time he got home that the United States did not have a bioweapons program. But when the final report was issued by the inspectors to the government of Boris Yeltsin it stated that they had found plenty of evidence for a program. Alibek refused to participate in the writing of that report, and he decided to quit Biopreparat.

"It was a confused situation," he said. "It was at the exact time when the Soviet Union collapsed. I told all these people I didn't agree with their politics." For a few months, he hung on in Moscow, supporting his family by trading—"It was easy to make money in those days, you could trade anything"—but he found that his telephone was tapped, and that the K.G.B. had set up a so-called gray unit to watch him, a surveillance team stationed near his apartment. He decided to move his family to Alma-Ata, in Kazakhstan. What happened next Alibek refuses to talk about. He will not tell me how he got his family to the United States. Once here, he dropped completely out of sight. It is pretty obvious that he was holed up with American intelligence people, discussing his scientific and technical knowledge with them. Several years went by and Dr. Alibek morphed into Ken Alibek.

The most powerful bioweapons are dry powders formed of tiny particles that are designed to lodge in the human lung. The particles are amber or pink. They have a strong tendency to fly apart from one another, so that if you throw them in the air they disperse like a crowd leaving Yankee Stadium. As they disperse, they become invisible to the human eye, normally within five seconds after the release. You can't see a bioweapon, you can't smell it, you can't taste it, and you don't know it was there until days later, when you start to cough and bleed, and by that time you may be spreading it around. Bill Patrick holds five patents on special processes for making biodusts that will disperse rapidly in the air and form an invisible sea of particles. His patents are classified. The U.S. government does not want anyone to obtain Patrick's research.

The particles of a bioweapon are exceedingly small, about one to five microns in diameter. You could imagine the size this way: around fifty to a hundred bioparticles lined up in a row would span the thickness of a human hair. The particles are light and fluffy, and don't fall to earth. You can imagine motes of dust dancing in a shaft of sunlight. Dust motes are mostly bits of hair and fuzz. They are much larger than weaponized bioparticles. If a dust mote were as thick as a log, then a weaponized bioparticle would resemble a child's marble. The tiny size of a weaponized bioparticle allows it to be sucked into the deepest sacs of the lung, where it sticks to the membrane, and enters the bloodstream, and begins to replicate. A bioweapon can kill you with just one particle in the lung. If the weapon is contagious in human-to-human transmission, you will kill a lot of other people, too. So much death emergent from one particle. Given the right weather conditions, a bioweapon will drift in the air for up to a hundred miles.

Sunlight kills a bioweapon. That is, a bioweapon biodegrades in sunlight. It has a "half-life," like nuclear radiation. This is known as the decay time of the bioweapon. Anthrax has a long decay time—it has a tough spore. Tularemia has a decay time of only a few minutes in sunlight. Therefore, tularemia should always be released at night.

For many years during the nineteen-fifties and sixties, Bill Patrick had his doubts that bioweapons work. Those doubts were removed decisively during the summer of 1968, when one of the biggest of a long series of open-air biological tests was conducted over

the Pacific Ocean downwind of Johnston Atoll, a thousand miles southwest of Hawaii. There, in reaches of open sea, American strategic tests of bioweapons had been conducted secretly for four years. Until very recently, these tests remained unknown to people without security clearances.

"We tested certain real agents, and some of them were lethal," Patrick said. The American strategic tests of bioweapons were as expensive and elaborate as the tests of the first hydrogen bombs at Eniwetok Atoll. They involved enough ships to have made the world's fifth-largest independent navy. The ships were positioned around Johnston Atoll, upwind from a number of barges loaded with hundreds of rhesus monkeys.

Late one afternoon, Bill Patrick went out to Johnston Atoll and stood on the beach to watch a test. At sunset, just as the sun touched the horizon, a Marine Phantom jet flew in low, heading on a straight line parallel to the beach, and then continued over the horizon. Meanwhile, a single pod under its wings released a weaponized powder. The powder trailed into the air like a whiff of smoke and disappeared completely. This was visual evidence that the particles were flying away from one another. Patrick's patents worked.

The scientists call this a line-source laydown. The jet was disseminating a small amount of biopowder for every mile of flight (the exact amount is still classified). One can imagine a jet doing a line-source laydown over Los Angeles, flying from the San Fernando Valley to Long Beach, releasing dust from a single pod under the wing. It would take a few minutes. The jet would appear on radar, but the trail of bioweapon would be invisible. In Iraq, United Nations inspectors found a videotape of an Iraqi Phantom jet doing a line-source laydown over the desert. The techniques looked precisely like the American laydowns, even to the Iraqis' use of a Phantom jet. The one difference was that the Iraqi Phantom had no pilot: it was a remote-controlled drone.

At Johnston Atoll, the line of particles moved with the wind over the sea, somewhat like a windshield wiper sweeping over glass. Stationed in the path of the particles, at intervals extending many miles away, were the barges full of monkeys, manned by nervous Navy crews wearing biohazard spacesuits. The line of bioparticles passed over the barges one by one. Then the monkeys were taken back to Johnston Atoll, and over the next few days half of the died. Half of the monkeys survived, and were fine. Patrick could see, clearly enough, that a jet that did a laydown of a modest amount of military bioweapon over Los Angeles could kill half the city. It would probably be more efficient at causing human deaths than a ten-megaton hydrogen bomb.

"What was the agent you used?" I asked Patrick.

"I don't want to tell you. It may still be classified. The real reason is that a lot of countries would like to know what we used, and not just the Iraqis. When we saw those test results, we knew beyond a doubt that biological weapons are strategic weapons. We were surprised. Even we didn't think they would work that well."

"But the agent you used was curable with antibiotics, right?" I said.

"Sure."

"So people could be cured—"

"Well, think about it. Let's say you hit the city of Frederick, right here. That's a small city, with a population of about fifty thousand. You could cause thirty thousand infections. To treat the infections, you'd need—let me see." He calculated quickly: "Eighty-four grams of antibiotic per person . . . that's . . . oh, my heavens, you'd need more

than two tons of antibiotic, delivered overnight! There isn't that much antibiotic stored anywhere in the United States. Now think about New York City. It doesn't take a mathematician to see that if you hit New York with a biological weapon you are gonna tie things up for a while."

Today, Biopreparat is a much smaller organization than it was during the Soviet years, and it is ostensibly dedicated entirely to peaceful research and production. You can buy face cream and vodka made by Biopreparat. Vector, where Variant U was developed, is no longer part of Biopreparat. The Vector laboratories are undergoing an extremely painful and perhaps incomplete conversion to peaceful use, and the Vector scientists are secretive about some of their work. Dr. Frank Malinoski, who was a member of the British-American team that inspected Vector in the early nineteen-nineties, told me that it is now generally believed that the weapons program has been taken over by the Russian Ministry of Defense. "If Biopreparat was once an egg, then the weapons program was the yolk of the egg," he said. "They've hard-boiled the egg, and taken out the yolk and hidden it."

If, in fact, the yolk exists, what can Western governments do about it? After years of avoiding confrontation with the Russians over bioweapons, American officials are still uncertain how to proceed. Twenty million dollars or so—no one seems sure of the amount—has been budgeted by a hodgepodge of agencies to offer financial support to Russian biologists for peaceful research (so they won't go abroad). The National Academy of Sciences, for example, spent a million and a half dollars on research funding for the Russians this past year. But the agencies are in a quandary, and fear the scandal that would ensue if it turned out that their funds had been diverted for weapons research.

The yolk of the bioweapons program may now be hidden away in military facilities run by the Russian Ministry of Defense, which are off limits to Americans. The largest of these is a complex near Sergiyev Posad, and old town about thirty miles northeast of Moscow. It's not clear how much real control Boris Yeltsin has over the Russian military. If the Ministry of Defense wanted to have a bioweapons program, could anyone tell it to stop? One prominent American scientist said to me, "All of our efforts in touchy-feely relationships have certainly engaged the former Biopreparat people, but we've been turned down flat by the military people. No doubt they're hiding something at Sergiyev Posad, but what are they hiding? Is it a weapons program? Or is it a shadow that doesn't mean anything, like the shadow on the shade in 'Home Alone'? We just don't know."

Meanwhile, there is strong suspicion that at some of the more visible laboratories weapons-related genetic engineering is being conducted. Genetic engineering, in military terms, is the creation of genetically altered viruses and bacteria in order to enhance their power as weapons. This work can be done by altering an organism's DNA, which is the ribbon-like molecule that contains the organism's genetic code and is found in every cell and in every virus particle. Three months ago, researchers at the Center for Applied Microbiology at Obolensk—the place south of Moscow where Biopreparat once developed and mass-produced hot strains of Black Death for Soviet missiles and weapons systems—published a paper in the British medical journal *Vaccine* describing how they'd created a genetically engineered anthrax. The Obolensk anthrax, they reported, was resistant to the standard anthrax vaccine.

Ken Alibek thinks that the Russians published information about their research be-

cause "they are trying to get some kind of 'legalization' of military genetic engineering," and because they are proud of their work. The Biological Weapons Convention is vague on exactly what constitutes research into an offensive weapon. Alibek said that the Russian biologists are trying to push the envelope of what is permissible. Then, "if someone other than Boris Yeltsin was in power, they could re-create their entire biological-weapons program quickly."

Western biowarfare experts don't know if the new engineered anthrax is as deadly as normal anthrax, but it may be, and it could fall into the wrong hands, such as Iraq or Iran. The real problem may lie in those countries. Genetic-engineering work can be done in a small building by a few Ph.D. researchers, using tabletop machines that are available anywhere in the world at no great cost. In high schools in the United States today, students are taught how to do genetic engineering. The learn how to create new variants of (safe) bacteria which are resistant to antibiotics. One genetic-engineering kit for high-school students costs forty-two dollars and is sold through the mail.

A virus that seems particularly amenable to engineering is smallpox. According to Alibek and others, it is possible that smallpox has left Russia for parts unknown, travelling in the pockets of mercenary biologist. "Iran, Iraq, probably Libya, probably Syria, and North Korea could have smallpox," Alibek said. He bases his list partly on what Russian intelligence told him while he was in the program, for the Russians were very sensitive to other countries' bioweapons programs, and watched carefully. Bioweapons programs may exist in Israel (which has never signed the bioweapons treaty) and Pakistan. Alibek is convinced that India has a program. He says that when he was in Biopreparat, Russian intelligence showed him evidence that China has a large bioweapons program.

The deadliest natural smallpox virus is known as *Variola major*. Natural smallpox was eradicated from the earth in 1977, when the last human case of it appeared, in Somalia. Since then, the virus has lived only in laboratories. Smallpox is an extremely lethal virus, and it is highly contagious in the air. When a child with chicken pox appears in a school classroom, many or most of the children in the class may go on to catch chicken pox. Smallpox is as contagious as chicken pox. One case of smallpox can give rise to twenty new cases. Each of those cases can start twenty more. In 1970, when a man infected with smallpox appeared in an emergency room in Germany, seventeen cases of smallpox appeared in the hospital on the floors above. Ultimately, the German government vaccinated a hundred thousand people to stop the outbreak. Two years later in Yugoslavia, a man with a severe case of smallpox visited several hospitals before dying in an intensive-care unit. To stop the resulting outbreak, which forced twenty thousand people into isolation. Yugoslav health authorities had to vaccinate virtually the entire population of the country within three weeks. Smallpox can start the biological equivalent of a runaway chain reaction. About a third of the people who get a hot strain of smallpox die of it. The skin puffs up with blisters the size of hazelnuts, especially over the face. A severe case of smallpox can essentially burn the skin off one's body.

The smallpox vaccine wears off after ten to twenty years. None of us are immune any longer, unless we've had a recent shot. There are currently seven million usable doses of smallpox vaccine stored in the United States, in one location in Pennsylvania. If an outbreak occurred here, it might be necessary to vaccinate all two hundred and sev-

enty million people in the United States in a matter of weeks. There would be no way to meet such a demand.

"Russia has researched the genetic alteration of smallpox," Alibek told me. "In 1990 and 1991, we engineered a smallpox at Vector. It was found that several areas the smallpox genome—the DNA—can be used for the introduction of some foreign genetic material. The first development was smallpox, and VEE." VEE, or Venezuelan equine encephalitis, is brain virus. It causes a severe headache and near-coma, but it is generally not lethal. Alibek said that the researchers spliced VEE into smallpox. The result was a recombinant chimera virus. In ancient Greek myth, the chimera was a monster made from parts of different animals. Recombination means the mixing of genes from different organisms. "It is called smallpox-VEE chimera," Alibek said. It could also be called Vee-pox. Under a microscope, Alibek said, the Veepox looks like smallpox, but it isn't.

According to Alibek, there was one major technical hurdle to clear in the creation of a workable Veepox chimera, and he says that it took the Vector researchers years to solve the problem. They solved it by finding more than one place in the smallpox DNA where you could insert new genes without decreasing smallpox's ability to cause disease. Many researchers feel that the smallpox virus doesn't cause disease in animals in any way that is useful for understanding its effects on humans. Alibek says that the Russians tested Veepox in monkeys, but he says that he doesn't know the results.

More recently, Alibek claims, the Vector researchers may have created a recombinant Ebola-smallpox chimera. One could call it Ebolapox. Ebola virus uses the molecule RNA for its genetic code, whereas smallpox uses DNA. Alibek believes that the Russian researchers made a DNA copy of the disease-causing parts of Ebola, then grafted them into smallpox. Alibek said he thinks that the Ebolapox virus is stable—that is, that it will replicate successfully in a test tube or in animals—which means that, once created, Ebolapox will live forever in a laboratory, and will not uncreate itself. Thus a new form of life may have been brought into the world.

"The Ebolapox could produce the form of smallpox called blackpox," Alibek says. Blackpox, sometimes known as hemorrhagic smallpox, is the most severe type of smallpox disease. In a blackpox infection, the skin does not develop blisters. Instead, the skin becomes dark all over. Blood vessels leak, resulting in severe internal hemorrhaging. Blackpox is invariably fatal. "As a weapon, the Ebolapox would give the hemorrhages and high mortality rate of Ebola virus, which would give you a blackpox, plus the very high contagiousness of smallpox," Alibek said.

Bill Patrick became exasperated. "Ken! Ken! I think you've got overkill here. What is the point of creating an Ebola smallpox? I mean, it would be nice to do this from a scientific point of view, sure. But with old-fashioned natural smallpox you can bring a society to its knees. You don't need any Ebolapox, Ken. Why, you're just gonna kill everybody."

"I suspect that this research has been done," Alibek said calmly.

Lev Sandakhchiev, the head of Vector, strongly denies this. "In our center we developed vaccinia-virus recombinants with VEE viruses and some others," he says. Vaccinia is a harmless virus related to smallpox. It is used for making vaccines.

"How much do you think it would cost to create genetically engineered smallpox?" I asked Alibek.

"This is not expensive." He paused, thinking. "A few million dollars. This is what it

cost us for making the smallpox-VEE chimera at Vector in 1990 and 1991.

Ken Alibek's statements about the genetic engineering of smallpox are disturbing. I felt a need to hear some perspective from senior scientists who are close to the situation. Dr. Peter Jahrling is the chief scientist at USAMRIID, and he has visited Russia four times in recent months. ("It seems as if all I do these days is visit Russia," he said to me.) He knows the scientists at Vector pretty well. He has listened to Alibek and questioned him carefully, and he doesn't believe him about the Ebola-smallpox chimera. "His talk about chimeras of Ebola is sheer fantasy, in my opinion," Jahrling said. "This would be technically formidable. We have seen zero evidence of the Vector scientists doing that. But a smallpox chimera—is it plausible? Yes, it is, and I think that's scary. The truth is, I'm not so worried about governments anymore. I think genetic engineering has been reduced to simple enough principles so that any reasonably equipped group of reasonably good scientists would be able to construct a credible threat using genetic engineering. I don't think anyone could knock out New York City with a genetically engineered bug, but someone might be able to knock out a few people and thereby make an incredible panic."

Joshua Lederberg is a member of a working group of scientists at the National Academy of Sciences who advise the government on biological weapons and the potential for bioterrorism. He is a professor at Rockefeller University, in Manhattan, and is considered to be one of the founders of the biotechnology revolution. He received the Nobel Prize for discovering—in 1946, when he was a young man—that bacteria can swap genes with each other. It was apparent to him even back then that people would soon be moving genes around, for evil as well as good.

I found Lederberg in his office, in a modest building covered with vines, in a green island of grass and trees on Manhattan's East Side. He is in his seventies, a man of modest size and modest girth, with a trim white beard, glasses, intelligent hazel eyes, and careful sentences. Lederberg knows Alibek and Pasechnik. He said to me, "They are offering very important evidence. You have to look carefully at what they're saying, but I offer high credibility to their remarks in general." He seemed to be choosing his words. As far as what was going on at Vector, he says that "with smallpox, anything could have happened. Lev Sandakhchiev is one of the world's authorities on the smallpox genome. But there are all kinds of reasons you'd want to introduce modifications into smallpox." He said that you might, for example, alter smallpox in order to make a vaccine. "You have to prove intent to make a weapon," he said.

Researchers normally introduce new genes into the vaccinia virus. Vaccinia doesn't cause major illness in humans, but if you're infected with it you become immune to smallpox. When the new genes are introduced into vaccinia, they tend to make the virus even weaker, even less able to trigger disease. Putting new genes into smallpox presumably might make it weaker, too. Alibek insisted that the Russians have found places in the genome of smallpox where you can insert new genes, yet the virus remains deadly.

I said to Lederberg, "If someone is adding genes from Ebola to smallpox virus, and it's making the smallpox more deadly, as Alibek says is happening in Russia, isn't that evidence of intent to make a weapon?"

"No," he said firmly. "You can't prove intent by the experiment itself. It's not even clear to me that adding Ebola genes to smallpox would make it more deadly. What

troubles me is that this kind of work is being done in a clandestine way. They are not telling us what is going on. To be doing such potentially evil research without telling us what they are doing is a provocation. To do an experiment of this kind in the United States would be almost impossible. There would be an extensive review, and it might well not be allowed for safety reasons. The experiment is extremely dangerous, because things could get out of hand."

Lederberg agreed that Russia does have a clandestine biological-weapons program today, though it's not at all clear how much Vector and Biopreparat have to do with it, since they are independent entities. As for the biological missiles once aimed at the U.S., it doesn't surprise him: "You can put anything in a ballistic missile."

Lederberg seems to be a man who has looked into the face of evil for a long time and hasn't blinked. He is part of a group of scientists and government officials who are trying to maintain a dialogue with Russian biologists and bring them into the international community of science. "Our best hope is to have a dialogue with Sandakhchiev," he said quietly. "There is no technical solution to the problem of biological weapons. It needs an ethical, human, and moral solution if it's going to happen at all. Don't ask me what the odds are for an ethical solution, but there is no other solution." He paused, considering his words. "But would an ethical solution appeal to a sociopath?"

Terrorism is the uncontrolled part of the equation. A while ago, Richard Butler, who is the head of the United Nations Special Commission weapons-inspection teams in Iraq, remarked to me, "Everyone wonders what kinds of delivery systems Iraq may have for biological weapons, but it seems to me that the best delivery system would be a suitcase left in the Washington subway."

Could something like that happen? What would it be like? The truth is that no one really knows, because lethal bioterror on a major scale has not occurred. At one point in my talk with Ken Alibek in Bill Patrick's kitchen that winter afternoon, we took a break, and the former master bioweaponers stood on the lawn outside the house, looking down on the city of Frederick. The view reaches to the Mt. Airy Ridge, a blue line in the distance. Clouds had covered the sun again.

Patrick was squinting east, with a professional need to understand the nuances of wind and cloud. "The wind is ten to twelve miles an hour, gusting a bit." He pointed to smoke coming from a building in the valley. "See the smoke there? It's drifting up a little, but see how it hangs? We have sort of an inversion today, not a good one. I'd say it's a good day for anthrax or Q fever."

Alibek lit a cigarette and watched the sky. He appraises weather the same way Patrick does.

Suddenly Patrick turned on his heel and went into his garage. He returned in a few moments carrying a large mayonnaise jar. He unscrewed the cap. The jar contained a fine, creamy, fluffy powder, with a mottled pink tinge. The pink was the dried blood of chicken embryos, he explained. "This is a simulant for VEE." It was a fake version of the weaponized brain virus. It was sterile, and had no living organisms in it. It was harmless.

The VEE virus can be grown in weapons-grade concentration in live chicken embryos. When the embryos are swimming with virus particles, you break open the eggs (you had better be wearing a spacesuit), and you harvest the sick embryos. You freeze-dry them and process them into a powder using one of Patrick's secret methods.

He shook the jar under my face. The blood-tinted powder climbed the sides of the jar. A tendril of simulated bioweapon reached for my nose.

Instinctively, I jerked my head back.

Patrick walked across the lawn and stood by an oak tree. Suddenly he extended his arm and heaved the contents of the jar into the air. His simulated brain-virus weapon blasted through the branches of a dogwood tree and took off in the wind heading straight down a meadow and across the street, booming with celerity toward Frederick. Within seconds, the aerosol cloud had become invisible. But the particles were there, moving with the breeze at a steady ten to twelve miles an hour.

Alibek watched, tugging at his cigarette, nonchalant, mildly amused. "Yeah. You won't see the cloud now."

"Some of those particles'll go eighteen to twenty miles, maybe to the Mt. Airy Ridge," Patrick remarked. The simulated brain virus would arrive in Mt. Airy in less than two hours. He walked back and put his hand on Alibek's shoulder, and smiled.

Alibek nodded.

"What are you thinking?" I asked Alibek.

He pursed his lips and shrugged. "This is not exciting for me."

Patrick went on, "Say you wanted to hit Frederick today, Ken, what would you use?"

Alibek glanced at the sky, weighing the weather and his options. "I'd use anthrax mixed with smallpox."

#### SENATE RESOLUTION 174

The text of the resolution (S. Res. 174) as agreed to by the Senate on March 11, 1998, is as follows:

##### S. RES. 174

Whereas the United States maintains a close bilateral partnership with Thailand and has a profound interest in furthering that relationship;

Whereas the friendship between our two countries goes back farther than that with any other Asian nation dating back to the Treaty of Amity and Commerce and Navigation of 1833;

Whereas the bilateral trade relationship is robust and promises to grow even more so in time;

Whereas the United States security relationship with Thailand is one of our most critical, and it is in both countries' interest to maintain and strengthen that relationship;

Whereas the new Government in Thailand has committed itself to making significant structural reforms to its economy in line with the conditions placed upon it by the International Monetary Fund, including improving financial and economic transparency and cutting its budget;

Whereas the conditions imposed on Thailand by the International Monetary Fund were developed in August of 1997, when the economic environment in Asia was vastly different from that existing today;

Whereas an example of those changed circumstances is the fact that both Korea and Indonesia provided second line of defense contingency loans to Thailand in August 1997, amounting to US\$500 million each; and

Whereas Thailand's democratic reforms have advanced with that country's economic growth and development: Now, therefore, be it

*Resolved*, That it is the sense of the Senate that—

(1) the United States should enhance the close political and security relationship between Thailand and the United States and strengthen economic ties and cooperation