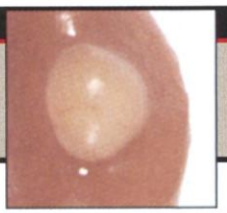
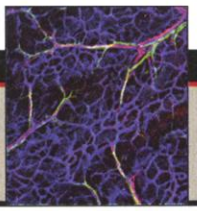


PAGE 2120
Growing a thymus



2121
Nerves lead the way for blood vessels

BIOWARFARE

Did Bioweapons Test Cause a Deadly Smallpox Outbreak?

WASHINGTON, D.C.—A preliminary report that a 1971 smallpox outbreak in the former Soviet Union was triggered by a secret bioweapon field test has sparked a heated debate—and some nasty backbiting—among the small circle of bioterrorism experts. The outbreak shows that an aerosol attack with smallpox could actually kill, and it suggests that the Soviets turned an extremely deadly smallpox strain into a weapon, said Alan Zelicoff, a physician and smallpox expert at the Sandia National Laboratories in Albuquerque, New Mexico, at a meeting* here last weekend. "I've never seen anything quite so disturbing," said Zelicoff.

Fateful voyage. Sailing too close to Vozrozhdeniye Island, a bioweapons test site, caused a 1971 smallpox infection aboard the *Lev Berg*, says Alan Zelicoff (*above*)—not a visit to one of several port cities.

If true, the allegations suggest that new drugs and vaccines against the strain are needed, some experts say. However, one top U.S. bioterrorism official, Donald A. Henderson, immediately questioned the idea that a test triggered the outbreak. Henderson, who led the worldwide smallpox eradication campaign and now advises the government on bioterrorism policy, accuses Zelicoff of seeking the media spotlight with a "half-baked report." But Kenneth Alibek, a former top manager at the Soviet bioweapons program who defected to the United States in 1992, backed most of Zelicoff's account in an interview with *Science*. Zelicoff, meanwhile, has urged Russian officials to investigate the incident and send the strain to the United States so researchers can find out how dangerous it is.

The epidemic in the city of Aralsk, Kazakhstan, on the northern shore of the Aral Sea, struck 10 people, killing three. At the time, the Soviet Union swept it under the rug and didn't report it to the World Health Organization—a violation of international agreements that in itself raises suspicions, Zelicoff says. News about it never reached the West until a classified official account, written in the 1970s, was sent to the Monterey Institute of International Studies in California last year by a Kazakh scientist. The report claimed the outbreak had a natural origin. But after scrutinizing the document and interviewing two of the surviving victims by phone, Zelicoff and his Monterey Institute colleagues reached a different conclusion.

The Soviet report concluded that the first patient most likely contracted smallpox while on a 2-month excursion on the *Lev Berg*, an ecological research ship. She probably picked up the virus during visits to Uyaly or Komsomolsk, two cities where the boat docked during its voyage (see map), then brought it home to Aralsk. But smallpox's incubation period makes that theory problematic, Zelicoff argues; moreover, the young woman never disembarked at any of the ports of call. A much more plausible explanation, he says, is that she was infected when the ship passed close to Vozrozhdeniye Island, at the time a top-secret outdoor testing site for bioweapons.

Zelicoff suggests that the strain was unusually infectious, because three of the 25 people who were vaccinated against smallpox and were close to a vaccinated patient got sick themselves—an unusually high percentage. What's more, three patients who had never been vaccinated developed the fatal hemorrhagic form of smallpox, which in other outbreaks occurred in fewer than 2% of patients. "That could be due to chance," says Zelicoff, "but boy. . . ."

At the meeting, Henderson immediately went on the attack. Ultraviolet light would quickly kill the virus in an aerosol cloud wafting over the Aral Sea, he argued—and if somehow it had survived, it would have infected more than just a single crew member aboard the ship. Zelicoff—who was initially denied a chance to respond because time was running out, creating an uproar in the audience—countered that aerosol tests would have been carried out at night to reduce UV exposure, and that the woman was particularly vulnerable because she spent much more time on deck than other crew members. Zelicoff accuses Henderson of downplaying the findings because they are a strong argument for keeping the smallpox virus alive to study, whereas Henderson believes the world would be better off if the remaining caches, now tightly guarded in the United States and Russia, are destroyed (*Science*, 15 March, p. 2005). Henderson vehemently denies such a bias.

Alibek, in contrast, supports Zelicoff's analysis of the incident. After he joined the Soviet bioweapons program in 1975, two sources told him that a fatal smallpox incident had happened at Vozrozhdeniye Island a few years before, he says. (He didn't include the incident in his 1999 tell-all best-seller *Biohazard* because he didn't know any further details, he says.)

However, Alibek does not believe that the test involved a hitherto unknown strain but rather India-1967 (also known as India-1), a strain that the Soviets have long been suspected of using in their bioweapons program and whose DNA was sequenced in the early 1990s. Smallpox researcher Peter Jahrling of the U.S. Army Medical Research Institute

CREDIT: (TOP) KENNETH LAMBERT/AP

* "The Scientific Basis for Vaccination Policy Options," Institute of Medicine, 15 June.

of Infectious Diseases in Fort Detrick, Maryland, is also "not completely convinced" that the Aralsk strain is an unknown, exceptionally virulent strain, in part because of the small numbers on which Zelicoff based his conclusions.

Such questions could be resolved by studying the strain or tissue samples from the 1971 outbreak, which Zelicoff is convinced are stored somewhere in Russia. But when he tried to enlist his counterparts at VECTOR, the biodefense lab in Siberia where the Russian smallpox isolates are kept, they initially denied any knowledge of the incident, he says. Only after announcing that he would go public did they agree to look in their freezers.

Zelicoff and Jahrling find this reticence troubling—especially because U.S. financial support keeps VECTOR and several other former Soviet bioweapons labs running, and mutual visits have fostered close ties between the former enemies' scientists. "These people are my friends," says Zelicoff, "and yet it appears that they are lying."

–MARTIN ENSERINK

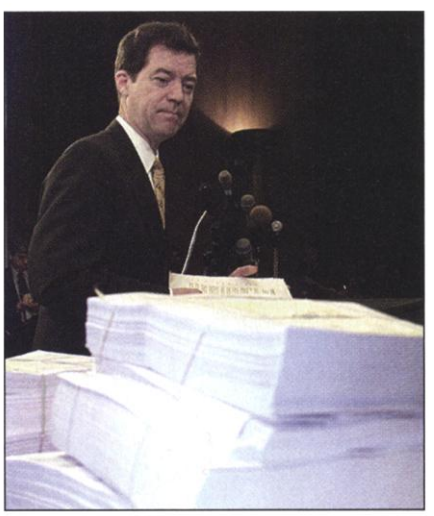
CLONING

Moratorium Replaces Ban as U.S. Target

Biomedical research advocates appear to have won a major victory in the U.S. Senate. Senator Sam Brownback (R–KS) last week announced that he was abandoning his efforts to persuade the Senate to pass a bill outlawing all human cloning—including some types of research aimed at developing new medical treatments. Instead, Brownback says he will work to win congressional approval for a 2-year moratorium on such work. But critics say even that step would cause unacceptable delays for studies that could result in important medical benefits.

Science advocates are pleased with the latest turn of events, but they don't plan to pack up and go home. "We've made great progress, but there is a very long way to go," says Kevin Wilson of the American Society for Cell Biology, one of many research groups opposing Brownback's bill. And Brownback's allies, who just months ago seemed likely to prevail, promise that "the issue isn't going to go away. There is going to be a sort of guerilla campaign now," says Nigel Cameron of the Council for Biotechnology Policy, a conservative think tank in Reston, Virginia.

For months, senators and science lobbyists have been preparing for what was expected to be an emotional and historic debate over how the government should regulate cloning, an array of techniques that can produce genetically identical embryos. The predebate tension was heightened by reports that some scientists were on the road to cloning humans. Last summer, the House of Representatives passed legislation that would make it a criminal offense to engage in either reproductive cloning or so-called therapeutic cloning, in which scientists would transplant the nucleus from an adult cell into an embryo to produce genetically matched cells that might be useful for medical treatments. Brownback sponsored a similar bill in the Senate. But biomedical researchers and patient groups felt that Brownback's bill went too far. Instead, they supported a competing proposal that would ban reproductive cloning but allow related research to continue with greater regulation (*Science*, 10 May, p. 997).



Strategic retreat? Senator Sam Brownback now says he'll settle for cloning moratorium.

Brownback, who had the backing of several conservative groups and President George W. Bush, once appeared to have the votes to pass his bill. But a broad coalition of research and patient groups fought back with an arsenal that included television ads and Capitol Hill visits from Hollywood stars, Nobel Prize–winning scientists, and children suffering from currently incurable conditions. Their message: Don't lump therapeutic research in with the reproductive cloning ban. The tide turned in their favor last month after Senator Orrin Hatch (R–UT), a leading antiabortion conservative, announced that he would oppose Brownback's bill.

Last week, Senate leaders seemed close to a deal to bring the dueling bills to a vote. But negotiations collapsed after neither side could show that it had at least the 60 votes needed to overcome procedural hurdles and bring their bill to a vote. As a result, Senate Majority Leader Tom Daschle (D–SD) put the gridlocked issue aside.

The move angered Brownback, who told reporters last week that opponents—including Daschle—had set ground rules that were "stacked … against me." He has since moved—so far unsuccessfully—to attach pieces of his bill, including a cloning moratorium and a ban on cloning-related patents, to unrelated bills before the Senate.

Brownback's opponents have vowed to block a moratorium. "A moratorium of a year or two may not seem like much … but it could mean the difference between life and death for a patient with Parkinson's disease," says Senator Edward Kennedy (D–MA), alluding to the high hopes that some patient groups have for therapeutic cloning. "From the science community's perspective, a moratorium equals a ban," adds Wilson. Some observers say that Brownback's tactics reflect his growing desperation. "The fact that he has fallen back to the idea of a 2-year moratorium suggests that he can't find the votes he needs," says Pat White of the Federation of American Societies for Experimental Biology.

The current stalemate doesn't bother White and other science lobbyists. "[Having] no bill is better than [passing] Brownback's bill," says one. However, the inaction also leaves in limbo the one issue on which all sides can agree—the need to ban human reproductive cloning.

–DAVID MALAKOFF

RADIOLOGICAL TERRORISM

New Effort Aims to Thwart Dirty Bombers

CAMBRIDGE, U.K.—Russia and the United States have agreed to join forces on an unprecedented effort to hunt down stray radioactive materials—the potential stuff of dirty bombs—across the former Soviet Union. Under the agreement, expected to be announced next week, Russia will provide information on "orphaned" sources that could

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