# Russian Science Aid Falls Short

If there's a way to fail in trying to help the former Soviet Union, you can be sure some Western aid program has found it, as the crisis in science continues

On 17 February 1992, then-U.S. Secretary of State James Baker walked into the office of Russian President Boris Yeltsin and told him the United States was ready to do its part to save science in the former Soviet Union (FSU). Baker pledged $25 million to help FSU weapons scientists find peacetime research projects to keep them out of the clutches of developing nations seeking nuclear technology. After Yeltsin welcomed the offer, the European Community (EC) quickly joined the relief effort, anteing up $29 million, and Japan promised $17 million more. President Bush announced the effort on television and U.S. officials confidently predicted that the International Science and Technology Center (ISTC), as it was to be known, would issue its first grants by May 1992.

Today, 16 months later, the ISTC has yet to grant a dime. The sponsoring nations didn't agree until late last year on the details of the plan, by which time it had become a pawn in the domestic battle in Russia between hard-line conservatives and Yeltsin loyalists. Last month the Russian Parliament went on summer recess without ratifying an agreement to establish the ISTC, ensuring no action before the fall. That may be too late: The promise of U.S. money expires on 30 September, and some $8 million that Japan had already allocated for the effort expired in March, although Japanese officials say they are prepared to come up with their share if progress is ever made. The prospects for the ISTC are now so dim that President Clinton's National Security Council (NSC) has entered the fray in a last-ditch attempt to salvage some of the center's objectives.

Unfortunately for cash-starved FSU scientists, what happened to the ISTC is typical of foreign-aid efforts to help them. (The one possible exception is those involved with the former Soviet space program. Last week, U.S. Vice President Al Gore and Russian Prime Minister Victor Chernomyrdin signed an agreement that would unite the two countries' plans for a space station, pay Russia $100 million to use its existing station, Mir, and allow Russia to compete for contracts to launch international commercial satellites.) Of the more than $250 million promised to date for FSU science under various programs, less than $34 million has actually been delivered (see table). One program after another has fallen victim to Western bureaucracy, FSU politics, or the general chaos in the former communist lands. Beyond the heroic—but tiny—initiatives of several scientific societies, the sole major success is billionaire U.S. financier George Soros, who in the past few months has cut through the thicket of problems by sheer force of cash—plus some ingenuity. Soros even had to create a Western-style banking and accounting system that can both meet the needs of FSU scientists and satisfy U.S. tax laws.

But one big success story is not enough to resuscitate Russian science. The amount of research being done continues to decline as scientists, disillusioned by the stream of unfilled promises and battered by economic hardship, abandon research or even flee the country. At Chelyabinsk-70, Arzamas-16, and other weapons labs once closed to outsiders, scientists accustomed to receiving a good salary and a free home now spend much of their time scrambling for food. Many have not been paid since May, and the shortage of hard cash is so desperate that a U.S. State Department official tells of one Russian researcher at a civilian laboratory who received a month's salary in vacuum cleaners —which he was forced to sell on a Moscow street corner to get money to feed his family.

"There's a lot of disenchantment with aid from the West," says Gerson Sher, chief operating officer of Soros' International Science Foundation (ISF). "Nothing's really happened." And for many of the FSU researchers who have waited in vain for aid, even the ISF program may be too little, too late. Alexi Dnestrovskij, a physicist in the Kurchatov Institute plasma theory division in Moscow, says 20 of the 54 scientists in his division have already left for the West and that "almost nobody is going to come back, [regardless] of aid to FSU science."

**WHO'S HELPING THE RUSSIANS**

| Initiative | Promised (million $) | Delivered * (million $) | Status |
|---|---|---|---|
| Soros (ISF) | 100 | 20 | 10,000 $500 grants to be awarded this fall |
| ISTC | 74 | 0 | Awaiting approval by Russian Parliament, outlook uncertain |
| Rep. Brown (D–CA) | 25 | 0 | Science Foundation proposal is part of 1993 defense bill but no funds have been approved |
| NSF Program | # | 5 | Mostly temporary fellowships for research in the United States |
| NIH Program | # | 7 | Mostly temporary fellowships to work at NIH |
| EC Association | 27 | 0 | First collaborative grants approved but not yet issued |
| Howard Hughes Medical Institute | 15 | 0 | Announced June 1993, about 40-60 grants of $10,000 to $75,000 a year for basic biology research in the FSU; an equal amount for collaboration with the West |
| **Societies** | | | |
| AAAS | # | 0 | First shipment of 2904 journals was delivered last month |
| APS | # | 1.3 | 2600 grants and thousands of journals, fund now depleted |
| AAS | # | .1 | Grants, journals, and computers |
| AMS | # | .3 | 450 scientists supported with $50 and $25 monthly stipends |
| ACS | # | .3 | Mostly journals (face value) |

* 1992 & 1993 combined
\# No specific amount promised

### Chaos in the East

Some of that disenchantment should be directed at the Russian bureaucracy. It was hard enough to get all 12 EC nations, along with the United States and Japan, to ratify the ISTC agreement —and even more time-consuming to translate every document into 13

languages. But those difficulties paled in comparison with the obstacles thrown up by internal Russian politics. Months passed as every Russian agency with even the remotest interest took a crack at the agreement. U.S. State Department officials, for example, laboriously cleared the proposal with the Ministry of Science and Education, only to see the ministry split into two separate ministries, each of which had to approve the initiative again.

As bad as the Russian bureaucracy was, the new Parliament has been even worse. For the past 10 months the ISTC has been a political football in a game of internal politics between hard-core conservatives and the Yeltsin party apparatus. Part of the problem was that the original agreement had been signed by the Russian foreign minister, a Yeltsin loyalist. "It could be milk for babies and they'd still find some way to be obstructionist," says one U.S. State Department official. But there were substantive issues as well. "Some conservatives saw it as a humiliation for Russia to accept money for its nuclear science," says Roald Sagdeev, a former Russian physicist now at the University of Maryland. "Others worried that it was an opportunity for the United States to maintain a presence" at the FSU weapons complex.

With the U.S. money about to expire, State Department officials are scrambling to save what they can. They're still hoping that ISTC will be on the table when the Parliament formally returns this month from its recess. (It has reconvened several times in the past month for brief sessions to deal with emergencies.) But with no guarantee that the project will escape partisan politics, NSC and State Department officials are considering alternatives, including asking Congress to carry the money over into the fiscal year that begins on 1 October.

### EC stumbles, too

The ISTC is not the only high-profile project to fall on its face. A separate $63 million EC effort in its directorate for science, research, and development (DG-12) also came up short. Launched in 1992 to support research collaborations between EC scientists and those in the Balkans, and Central and Eastern Europe, the DG-12 program virtually imploded under the weight of its own bureaucracy and pent-up FSU demand.

DG-12 officials spent months assembling a staff to process grant applications and organize panels of scientists to review grants in Brussels. But when a call for applications in mid-1992 generated more than 12,000 funding requests totaling a staggering $2 billion, the program's shaky review process collapsed. While the program floundered in a sea of submissions, then-DG-12 commissioner Filippo Pandolfi decided to suspend consideration of all requests except those from researchers in the eastern countries who wanted to work in EC labs for a few months. This spring, the program finally started funding the first round of requests; the eventual cost may reach $35 million.

Despite the DG-12 effort's chaotic first year, the EC nevertheless gave the program another $57 million in 1993, this time expanded to include the FSU nations. But because the EC still has no "legal" mechanism for collaboration with FSU nations—and nothing happens with the EC if there isn't some intergovernmental agreement to base it on—concerned researchers lobbied to extract the FSU effort from the EC and its tangled bureaucracy. After a plea from Carlo Rubbia, the head of the European accelerator laboratory CERN, French President François Mitterrand spearheaded an effort in early 1992 to set up an international foundation to aid FSU science.

In an effort to distance it from the clutches of EC officialdom, member states in June 1992 agreed to recast the FSU program as a separate International Association for the Promotion of Cooperation with Scientists from the Independent States of the former Soviet Union, incorporated in Belgium. With an initial endowment of $27 million (obtained by transferring to the association all of the DG-12 program's FSU money for 1993), the association was formally launched in June 1993 and is now setting up operations.

### Hard-to-reach targets

Smaller government and private-sector programs have not fared much better. A proposal by U.S. Representative George Brown (D–CA) for a $25 million American/Russian Science Foundation in the FSU ended up as nonbinding language in a defense bill passed last fall—and was ignored by the Bush Administration. (NSC officials hope to revive it in some form this fall.) Collaborative research programs sponsored by the National Science Foundation and the National Institutes of Health have added some $9 million to the pot over the last 2 years, but most of the money has been spent to bring FSU researchers to the United States for brief fellowships. One congressional critic believes that such programs, by temporarily employing a few FSU scientists without making any significant progress towards reviving Russian science, "epitomize what's wrong with the U.S. efforts."

A program to distribute scientific jour-

**"There's a lot of disenchantment with aid from the West. Nothing's really happened."**

**–Gerson Sher**

## Wanted: A Few Thousand Good Reviewers

Sometime in the next 2 months, an opportunity to help science in the former Soviet Union (FSU) will land on the desks of more than 1000 U.S., European, and Japanese scientists. It will be a request to review one of several thousand grant proposals from FSU scientists that the Soros Foundation-sponsored International Science Foundation (ISF) expects to receive over the next few weeks.

The reviewers' job won't be easy. Many of the FSU researchers have never written a grant application before, much less one in English. The proposal may not match the quality of what is being funded in the West. Nevertheless, ISF officials hope that researchers will see these unannounced review requests as an opportunity to do their part to save FSU science, and will give them careful attention.

This is the ISF's second round of grants, which will be 2-year awards ranging from $10,000 to $100,000 for actual research projects. In a country where $1,000 is a good annual salary, the research grants are the nearest thing to winning the lottery, and competition is expected to be fierce. In contrast, the first round consisted of $500 grants made simply to sustain scientists; 98% of those who applied were funded.

Each applicant has been asked to nominate six potential reviewers, a majority from outside the FSU. The ISF will send each worthy proposal to half a dozen reviewers (not necessarily those suggested), asking each reviewer to suggest additional experts. If all goes smoothly, ISF officials hope to complete the mail review process by the beginning of December, convene the panels, and make their decision in January.

"There is never a good time for a flood of new review requests to show up in the mail," ISF officials said in a statement that accompanied their appeal for help. But they hope that scientists will be willing to use their expertise "to make a tangible contribution to basic research in the post-communist countries of the FSU."

–C.A.

## A Thin Lifeline to Genome Researchers

Although the West has been increasingly frustrated in its efforts to stem the decline of Russian science (see accompanying story), a program sponsored by the Office of Health and Environmental Research at the Department of Energy (DOE) is off to a hopeful—albeit modest—start.

Last December, David Galas, then head of DOE's part of the U.S. Human Genome Project, led a "grand tour" of Russian molecular biology with the hope of identifying projects that might mesh with DOE's research. The question, recalls Galas, was, "What could we do by sending them a small amount of money?" Galas, who recently left DOE to become vice president for research and development at Darwin Molecular Technologies, a new company in Seattle, was accompanied by two noted genome researchers: molecular biologist and computer scientist Elbert Branscomb of Lawrence Livermore (California) Laboratory and Raymond Gesteland, head of a National Institutes of Health-funded genome center at the University of Utah, who works on new sequencing technologies. The team visited a dozen research institutes and interviewed more than 100 scientific teams in Moscow, St. Petersburg, and Novosibirsk.

Although the review was perhaps less than rigorous, Galas concedes, the U.S. scientists had no difficulty identifying 22 worthy Russian teams. Drawing on its genome project funds, DOE is sending $5,000 a year to each of 21 groups; one very large team is receiving $30,000. These modest awards, which are going directly to the investigators, not their institutes, may be spent on anything from salaries to supplies and equipment. In return, the groups have promised to update DOE on their progress and to publish in the open literature.

Galas says DOE began sending the money this summer in "dribs and drabs," because they weren't certain it would get there at all. After DOE gets word that an installment has been received, it sends off the next small parcel, sometimes by direct wire, says DOE molecular biologist Marvin Stodolsky, whom Galas credits with working out the details of the program. So far the money has been getting through. But it's not clear how much the scientists will get to keep because the tax status of foreign funds is in flux, says Stodolsky. To circumvent these and other difficulties, some of the Russian grantees have designated U.S. scientists, or Russian colleagues already working here, to receive the money and buy the supplies for them.

The future of this small experimental program depends on Russia's economic stability, but Galas and Stodolsky hope it can be kept alive. "We are getting good science from excellent groups very economically," says Stodolsky. "We think it is in the U.S. benefit, the Russian benefit, and the world benefit that these groups can maintain their integrity, and we are making a very small contribution in that regard."

**–Leslie Roberts**

nals to the FSU that was announced early last year (*Science*, 14 February 1992, p. 793) by the American Association for the Advancement of Science (AAAS) is only now getting off the ground after frustrating logistical delays. Flying journals to the Moscow airport is simple enough, says AAAS international programs staffer Beth Boswell, but getting them through customs usually requires a bribe, something AAAS wanted to avoid. And there's no good way to distribute the journals to libraries outside Moscow. Eventually, AAAS signed a contract with Matrix International Logistics Inc., which takes shipments through St. Petersburg without paying off customs officials and delivers them throughout the country. The first shipment of journals left last month.

The American Physical Society (APS) has also overcome daunting challenges to get a small grants program under way. It spent nearly a year setting up an aid program in Ukraine, for example, only to have to start again when the government there collapsed in 1992. So far, it has distributed $1.3 million in grants, travel stipends, and journals in a program that became the model for the Soros initiative.

The greatest challenge for societies like the APS has been to get the money into the hands of FSU researchers. The APS essentially set up its own international banking network by brokering special agreements between U.S. banks and those in the FSU countries to allow FSU researchers to cash checks. This wasn't easy, says APS organizer Irving Lerch; in one case, the premier of the new Republic of Belarus personally had to set up a dollar account in the local bank to distribute grants. Two of the first U.S. groups to deliver aid to FSU science—the American Mathematical Society and the American Astronomical Society—sent travelers' checks or commissioned couriers to pass envelopes of $20 bills to FSU scientists, and Sun Microsystems Inc., a U.S. computer company, actually filled a suitcase with money to pay one group of FSU researchers.

### Reinventing government

Although the efforts of a few scientific societies are beginning to pay off, the international foundation created by Soros is by far the biggest game in town. By the end of the month it will have spent nearly $20 million on emergency grants, travel awards, and operating a staff in the FSU. Over the next 2 months, it will begin the process of reviewing applications for most of the rest of the promised $100 million (see sidebar, p. 1381).

But even with ready cash and the ability of a private agency to leap bureaucratic hurdles, the ISF faced the problem of awarding grants in a society lacking an adequate financial infrastructure. "In order to [distribute money] we had to essentially set up a banking system in a country that doesn't have one," says ISF executive director Harley Balzer. Most bank tellers have never seen a check, and bank-to-bank transfers, even within the same city, take weeks.

It took ISF officials nearly a year to reach a money-transfer agreement between the Bank of New York and the Moscow-based Menatep Bank that allows the ISF to print checks with the name of the FSU grantee and his or her passport number. The FSU scientists pick up the checks from the ISF's Moscow office, and cash them at the Menatep bank. But getting money into the hands of researchers isn't all that's needed. The ISF team discovered that it had to provide many of the services that a Western funding agency would take for granted. Take travel. Because government passport officials often withhold approval until just a day or two before departure—usually too late to buy tickets—the ISF decided to create its own travel agency to buy cheap tickets on a few hours' notice.

The ISF also wanted its grantees to be able to work in laboratories with electricity, heat, and a working roof—no longer a given at many FSU institutions. So each grant contains an extra 20% for overhead at the scientist's institution. And ISF will also handle the necessary accounting, by establishing a fund to pay electrical bills and other invoices it receives from institutions. The net effect, says ISF consultant Alex Goldfarb, a former Russian biologist now at the New York City Public Health Research Institute, is that ISF has taken on "both the role of funding agency and university business office." Soros hopes that this system will pass muster with U.S. Internal Revenue Service auditors, who monitor the foundation.

As the ISF hacked its way through this administrative jungle, some of the fiercest opposition came from the very group it is

trying to help. Officials at the Russian Academy of Sciences, declaring that they alone understand Russian science, wanted the money to be distributed through academy mechanisms rather than the ISF's ad hoc routes. But Balzer says this demand was only the last twitches of a dying officialdom: "I know we're doing the right thing when the Academy of Sciences is bitterly complaining." He says the ISF intends to "empower individuals, not bureaucracies."

Despite the setbacks, U.S. government officials say that their attempt to help FSU science has a silver lining: Russian officials now acknowledge the need for bank accounts and other mechanisms for distributing research funding that aren't controlled by the traditional hierarchy. And there have been small victories, too: During the debate on the ISTC project, the head of the state tax service agreed to exempt from taxes a range of revenue sources, including income from charitable grants.

Yet even the optimists do not expect the first round of Western aid to cure what ails the former Soviet Union. Instead, they hope that their limited success will pave the way for larger and more sustained programs to keep Russian science alive.

**–Christopher Anderson**

EPIDEMIOLOGY

# New Seveso Findings Point to Cancer

On 10 July 1976, an explosion at a Hoffmann-La Roche chemical plant released a cloud over Seveso, Italy, 13 miles north of Milan. Within a few hours, a mist began settling on the streets, buildings, and gardens of the small town. The vapors seemed harmless enough until, several days later, children began to develop chloracne—an acne-like condition that is a hallmark symptom of occupational exposure to dioxin, a lethal carcinogen in animals. Finally, 17 days after the accident, Italian officials confirmed the presence of dioxin and ordered an evacuation.

Now it appears those exposed to the dioxin cloud have a lot more to worry about than bad skin. In a study published this month in *Epidemiology*, a research team led by University of Milan epidemiologist Pier Alberto Bertazzi found an elevated risk of several cancers for those living in the contaminated regions of Seveso. The study follows a 1989 report from Bertazzi's group, published in the *American Journal of Epidemiology*, that described an increased rate of cardiovascular deaths among Seveso residents after the accident.

Researchers have collected conflicting data on dioxin's carcinogenicity in humans: Some studies of workers exposed to dioxin have pointed to an elevated cancer risk, while others have not. But the latest findings have heightened the fears of many scientists. "I think it's becoming increasingly difficult to maintain the view that dioxin's not a human carcinogen," says epidemiologist Olav Axelson of University Hospital in Linkoping, Sweden, who wrote an editorial accompanying the Italian study. Although Bertazzi himself is quick to point out shortcomings in the Seveso study—such as its lack of convincing exposure data—it's expected to strengthen the hand of U.S. Environmental Protection Agency (EPA) dioxin experts, who are completing a 2-year reassessment of dioxin's health risks that suggests dioxin is a human carcinogen.

Beginning work 9 years after the explosion, Bertazzi's team tracked down medical records for 37,000 people, 99% of those exposed. Bertazzi grouped them into three categories according to their likely degree of exposure to dioxin. Because the researchers rarely had measures of dioxin levels in the blood, they were forced to estimate exposure from soil concentrations of the chemical, as measured soon after the accident in and around Seveso. The researchers compared these groups' cancer rates (from 1976 to 1986) with those of 182,000 people in uncontaminated regions surrounding Seveso.

In none of the contaminated areas was the overall risk of developing cancer significantly elevated; however, the researchers did find increased rates of specific cancers in some populations. For example, among the 4800 people living in moderately contaminated areas, men were twice as likely to develop leukemias and lymphomas, and women five times as likely to get gallbladder or bile-duct cancer, compared with their counterparts in the dioxin-free areas. In the least-contaminated zone, which included some 32,000 people, men were three times as likely to develop soft-tissue sarcomas. "This is very consistent with what's been seen in studies of workers exposed to dioxin," says toxicologist Linda Birnbaum, who heads up EPA's dioxin research.

But one result has puzzled the experts: In the population thought to have had the most acute exposure to dioxin, none of the cancer rates was significantly elevated. Bertazzi says this finding may not be surprising because it is based on too small a number of people (724) classified as highly exposed.

Another puzzle is that the Seveso population apparently showed an excess risk for some cancers within a decade of the accident. In many occupational studies, the time between exposure and the appearance of cancer was at least 15 to 20 years. To Bertazzi and Axelson, the Seveso findings indicate dioxin may be exerting its effects late in the development of cancer. This theory runs counter to occupational studies, which have suggested dioxin acts at an early stage—perhaps as an initiator in the multistep carcinogenic process.

Two possible explanations are that other chemicals may either work in tandem with dioxin or themselves be responsible for the elevated cancer levels. Axelson favors the former; James Collins, an epidemiologist at Monsanto Co., a St. Louis-based chemical manufacturer, argues that other industrial contaminants, such as the carcinogen 4-aminobiphenyl, may be the cause of at least part of the cancer risk attributed to dioxin. Collins bases this opinion on a study his group published this January in *Epidemiology*, which reported that workers exposed to 4-aminobiphenyl during an accident at a Monsanto plant in 1949 later developed, among other cancers, soft-tissue sarcomas. This or some other carcinogenic compound in the Seveso cloud, Collins speculates, may have been responsible for the elevated cancer risk.


RAYMOND DAROLLE/SYGMA

**Renewed warnings.** Motorists were told in 1976 to roll up windows when passing the plant.

Still, some researchers are unimpressed with the 4-aminobiphenyl data. "We haven't ruled it out," says EPA dioxin researcher David Bayliss. "But if this really was a cause of soft-tissue sarcomas, why wasn't it picked up earlier?" he asks, referring to previous occupational studies of cancer incidence among chemical plant workers.

Bertazzi's team hopes to add another important piece to the dioxin puzzle later this decade after completing a 20-year follow-up of Seveso residents. In the meantime, he says, "This is not the final word from Seveso."

**–Richard Stone**