

Rough Times in Russia

Post-Soviet science faces a new crisis

By DAN VERGANO

The recently uncovered agora of Tanais points to its Greek origins.

In 1991, the Soviet Union boasted a scientific workforce of 1.5 million people. Since then, the number of working scientists has plummeted 40 percent, to 900,000, according to Western analysts' estimates. Some former researchers have retired, and many of those under age 40 have moved on to other occupations.

Western hopes that the number of Russian scientists was rebounding after years of decline diminished last October with the death of a prominent laboratory director. Reportedly despondent over his inability to pay researchers, Vladimir Nechai of the nuclear weapons laboratory Chelyabinsk-70 killed himself after his appeals to Moscow for more funding went unanswered.

"The outlook for Russian science is pessimistic," says political scientist Loren R. Graham of the Massachusetts Institute of Technology. Significant sources of Western aid have run out, years of neglect have eroded equipment, and economic turmoil has destroyed scientists' ability to work. Of all the people reeling from the collapse of the Soviet Union, scientists rank among those who have fallen the furthest in terms of pay, prestige, and professional opportunity.

For researchers who continue their pursuits, survival as a scientist is difficult. Archaeologist Tatyana M. Arsenjeva of the Russian Academy of Sciences has managed the excavation of the ancient town of Tanais in southern Russia for 20 years. Perched on the marshy edges of the River Don, the site has yielded over

20,000 amphorae—large tapered containers for oil, wine, grain, and so on—since excavations began in 1955. Surrounded by hundreds of these vessels in her workroom, Arsenjeva says that her goal is "to create a center for dating research finds using amphorae."

It isn't easy. Researchers at the dig make \$40 a month and are not always paid on time. A decades-old relationship with a large museum in the nearby city of Rostov-on-Don collapsed over differences on how to raise money.

Now, Arsenjeva faces her largest problem: how to obtain funds without losing the object of her research.

When the Greek historian Herodotus wrote about Tanais in the fifth century B.C., he reported that Amazons ruled the city. Now, foreign researchers control Tanais. In 1992, work at the site almost halted when Moscow cut off support. A collaborative agreement with German archaeologists brought in needed funding but wrenched control of the dig out of Arsenjeva's hands.

Instead of excavating the remains of houses, 90 percent of which are still buried, the German team preferred to search for the town's central meeting place, or agora, hoping to determine which ancient Greek city exerted the most architectural influence over Tanais. Polish researchers brought in by the Germans are most interested in the tombs of Goth tribesmen who roamed the region before 600 A.D.

Plans for excavations are fixed on

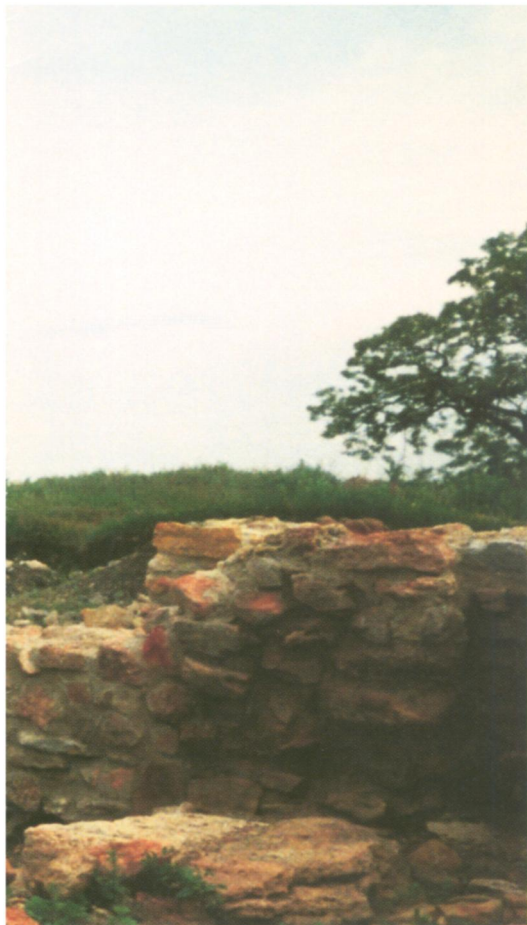
these two pursuits until the year 2000. Relations are friendly, but the Russians are now essentially working as contract researchers for foreigners at a site in their own country. "And we're lucky to have what we do," says Valeriy Chesnok, director of the small museum at Tanais.

The situation for scientists has worsened since 1991.

"A new cycle of crisis began in 1996," says economist Irina Dezhina of Moscow's Institute for the Economy in Transition. She estimates that basic researchers actually received only one-third of the \$2.7 billion allocated in the Russian budget last year. One-fourth of the 4,500 science institutes received no funding.

Scientists went on hunger strikes at some locations. "During the presidential elections, scientists were given a lot of promises," says Dezhina. "Afterwards, there were some political games involving science but no new resources." In fact, the cabinet-level Ministry for Science was abolished last fall, further eroding scientists' influence on the federal budget.

Institutes, not individual scientists, collect most of the checks for projects in Russia. In these straitened times, funding goes to the payroll first and to research last. Horror stories abound of scientists who win rare grants, only to see the funds disappear to pay utility bills or even, as many suspect, to line the pockets of administrators.



As a result, 90 percent of Russian scientists survive by working at other jobs, says Dezhina. Instead of an exodus of scientists to other nations in the early part of the decade, as Western security analysts feared, an internal brain drain has occurred. For every researcher who leaves the country, 10 have jumped into businesses such as banking or computer sales, Dezhina estimates.

In the newly capitalist Russia, scientific talent among entrepreneurs may be needed, but the cost to research is great. Typically, the researchers who change careers are young project managers just entering their most productive years as scientists.

"They're largely losing creative people," says Harley Balzer, a professor of Eurasian, Russian, and East European studies at Georgetown University in Washington, D.C. "Russian science is deteriorating faster than I can write about it."

The Soviet Union probably supported three times as many scientists as it needed, he says. "Cuts would not have been bad, if done rationally. Instead, those staying often have no initiative or no prospects."

One example of irrational cuts, says Balzer, is the occasional blanket firing of women researchers in the expectation that their husbands will support them. At the same time, some institutes have hung onto female workers because laws prohibit firing single mothers.

Archaic personnel policies, such as

providing researchers with food and housing, remain at some institutes, reminders of Soviet times when labs were more communities than workplaces.

On top of political and economic upheaval, a significant source of Western aid to Russian researchers ended in 1995 with the closing of the International Science Foundation (ISF), which Balzer once managed. A private aid effort financed by billionaire George Soros, the ISF started in 1993 with no-questions-asked emergency grants of \$500 to individual scientists. Introducing the idea of peer review to Russia, the charity went on to award 3,500 long-term grants averaging \$13,000 each. Many of the researchers were competing for funding for the first time.

Originally endowed with \$100 million, the fund shut its doors after giving away all of its cash. According to Balzer, Soros had calculated that the money would do Russian science more good as a one-time shot in the arm than as small annual amounts that would grow into a bureaucracy.

Although ISF's funds have run out, its insistence on peer review has left a legacy in Russia. Over 5 percent of the science budget will be awarded using the process in 1997. One problem is that the anonymous review is a fragile concept in Russian science. "Even the confidentiality of recommendation letters is a joke there," says Balzer.

Despite the ISF's closing, international funding remains one of the most stable sources of support for Russian science. Driven mostly by fears of Russian nuclear scientists taking their knowledge to hostile nations, Western countries have attempted to prop up research to keep the scientists in Russia. The U.S. Department of Energy's Initiatives for Proliferation Prevention, for example, supports some 2,000 former weapons scientists in an effort to direct

their research toward new areas.

The International Science and Technology Center (ISTC) in Moscow—funded by the U.S. State Department—has put \$121 million toward the same goal. A smaller effort, the Civilian Research and Development Foundation (CRDF) in Arlington, Va., supports collaborations between U.S. and Russian researchers. The CRDF receives money from the U.S. government and from Soros.

An assessment by the National Research Council in Washington, D.C., released in December 1996, concluded that the ISTC, along with other Western efforts, has largely succeeded in staving off the emigration of weapons scientists. One nuclear lab, Arzamas-16, now survives mostly through close cooperation with Los Alamos (Calif.) National Laboratory. However, the dire state of Russian science means that support for weapons scientists needs to continue indefinitely.

A tier of elite scientists who understand grant competition has developed since 1992, says Gerson Sher of the CRDF, but the vast majority still expect the state to award them funds simply because of their status as scientists. In the long term, he expects Russia to remain strong in mathematics and theoretical physics, but he sees little hope for applied science there. After using all their funds to pay salaries, labs have nothing left for buying new equipment, and what remains is either broken or obsolete.

"The arithmetic is very simple," says Sher. "Seventy to 80 percent of the science community's support in the past came from the defense sector, and now it's zero."

In his view, the only question left is how lab directors are going to cut researchers. Resources are running out, as is the patience of unpaid scientists. Sher predicts that further dramatic downsizing in the scientific community is inevitable "within the next year, or next 2 years at the outside." □



The map shows Arzamas-16, a nuclear laboratory thriving in collaboration with U.S. national laboratories; the Tanais archaeological site; and Chelyabinsk-70, a nuclear weapons lab suffering from severe funding shortages.