UKRAINE

Cash-Starved Researchers to Undergo Trial by Peer Review

KIEV—Every scientist in the West knows the feeling: You send off your grant proposal and hold your breath while it works its way through the exquisite torture known as peer review. Pity, then, the entire scientific community of Ukraine. In an action unprecedented in size and scope, the Ukrainian government, with Western help, plans to organize peer-review panels of foreign and Ukrainian scientists to assess the scientific caliber of every Ukrainian research team. The results will determine who is worthy of receiving state funding and who is not.

The 2-year-long review is supposed to identify robust institutes and also oases of good science in failing institutes. The goal is to find a way out of a dire situation: The country's 90,000 researchers and support staff have received almost no state salary for the past 5 months. Although a handful of scientists are able to maintain world-class labs (see box), most only go through the motions of showing up at their barren workplaces, many of which lack the funds to pay for heat and electricity. "In some institutes, the temperature in the rooms is about [freezing]," says Platon Kostyuk, director of the Bogomoletz Institute of Physiology. The conditions have put most scientific projects on ice too. "Some workers come for 1 day a week or even 1 hour a week," says former Ukrainian Science Minister Sergei Ryabchenko of the Institute of Physics.

The review, to begin in the autumn with an evaluation of Ukrainian biology, "is the only way to save Ukrainian science," asserts Kiev biophysicist Oleg Krishtal. "The state can't afford to support thousands of mediocre scientists," he says. And government officials say that, pending a final decision from Ukrainian President Leonid Kuchma, they intend to use the review to fire scientists who do not pass muster and perhaps close institutes wholesale. But moving to a Western-style survival-of-the-fittest approach faces formidable obstacles.

The review has many powerful enemies in the 20-member presidium of the Ukrainian National Academy of Sciences (UNAS), which runs the country's 160 research institutes. UNAS has always had a strong bias toward applied sciences, a legacy of generous funding from the Soviet military during the communist years, and many academy officials and senior scientists worry that basic researchers may see the review as an opportunity to even the score after decades on the sidelines. "All science called applied science will be leveled," says physicist Pavel Kislii of the Institute of Superhard Materials, noting that applied research is hard to gauge by criteria such as published papers.

The battle lines are also drawn between generations: Active scientists in their 30s and 40s tend to be the ones pushing reform measures, while older academy mandarins oppose them. At stake are thousands of research positions that would likely be eliminated after peer review. In addition, the Ukrainian government is planning a new fund that would award at least 10% of the science budget as competitive basic-research grants. Such a move would strip some of the power of the academy's presidium to dole out money to its institutes.

Both camps agree on one thing: The status quo is untenable. In the Soviet days, about 60% of UNAS's budget came from the military, which employed 70% of Ukraine's scientists. That money dried up in the late 1980s, and state spending on science has not filled the gap, having declined steadily from 3% of the gross national product in 1990 to 0.6% in 1995. In the past few years, UNAS has picked up responsibility for some three dozen centers, many of which were secret Soviet facilities cast adrift when Ukraine declared independence in 1991. Yet last year, the government handed over only 53% of $85 million it promised the academy.

Despite the obvious crisis, the academy—headed for 33 years by Boris Paton, the 77-year-old director of the largest institute in Ukraine, the 10,000-strong Institute of Electric Welding—has dragged its feet on reform. And the academy's inertia has stirred unrest among its rank and file. "The difficult state of UNAS is defined not only by its material impoverishment but by its rigidity, conservatism, and stagnation," Kiev botanist Konstantin Sytnik wrote in the 25 November issue of *The Week's Mirror*, a Kiev newspaper. "We are asking the state to intervene because we feel the academy is terminally ill," says Yuri Gleba, director of Kiev's International Institute of Cell Biology, who also manages the plant biotechnology research group at American Cyanamid in Princeton, New Jersey.

Paton declined to be interviewed for this article, but Kostyuk, a UNAS vice president, told *Science* that in a recent closed meeting of the academy presidium, Paton and other top officials concluded that the academy's staff should be shrunk by 25%, and they listed 10 institutes for closure. "Immediately these institutes fought this conclusion, arguing they are necessary," says Kostyuk. The result: Academy officials have yet to act.

In the meantime, Gleba, at 46 the youngest member of the UNAS presidium, and other reformers have seized the initiative. Last November, Gleba organized a meeting in Kiev to discuss concrete steps toward reform. It was attended by foreign scientists such as Sir Arnold Burgen and David Magnusson of the Academia Europaea and biologist and Soviet expert Valery Soyfer of George Mason University in Fairfax, Virginia, as well as top Ukrainian scientists and officials. The meeting recommended that the Ukrainian government request Academia Europaea—a nongovernmental association of 1600 European scientists that aims to promote education and research—to run an evaluation of the country's science.

The government agreed, and in a 5 December letter, Volodymyr Storizhko, chair of the State Committee for Science, Technology, and Industrial Policy, told Hubert Curien, Academia Europaea president and former French science minister, that "an inventory based on internationally accepted criteria and valuations is the first and most urgent step necessary prior to any serious reforms."

Storizhko told *Science* that the Ukrainian government and the Academia Europaea expect to receive the $1.7 million needed for the review from the International Renaissance Foundation—a fund created by U.S. financier George Soros to promote cultural development in Eastern Europe—and other nonprofit organizations. The favored approach, he says, is one proposed by Soyfer: Every Ukrainian scientist in charge of a lab will submit a recent grant proposal to the evaluation panel. Using key words from the proposal, the panel would search published abstracts to identify appropriate reviewers. The reviewers would then numerically rate the quality of the grant proposals.

Two panels—one of foreign scientists and the other of Ukrainians—will assess

Research Stars Use Ingenuity to Survive

R. STONE

Rocket science. Oleg Krishtal uses missile parts for measuring electrical impulses in cells.

KIEV—At first glance it appears that biophysicist Oleg Krishtal has sunk a fortune into his lab and its array of patch-clamp setups and other high-tech equipment for measuring electrical impulses in cells. Only a trained eye could discern that the piezoelectric motors were once parts of the guidance systems of Soviet missiles and that many other components were hand-built in Krishtal's lab at the Bogomoletz Institute of Physiology. While a modest electrophysiology setup costs about $50,000 in the West, Krishtal says his jury-rigged equipment works just as well and cost him less than one-third that amount. "We're capable of doing science much cheaper than in the West," Krishtal says.

Such inventiveness has helped Krishtal and a handful of other Ukrainian scientists to maintain world-class research labs. But in many ways Ukraine's active researchers are fighting a losing battle as their institutes struggle to pay for heating and lighting, and colleagues abandon science because of the difficult working conditions and miserable salaries. "I know many good scientists who get $50 a month to support a family of three," says Sergei Galushko of the Institute of Bio-Organic Chemistry and Petrochemistry. Some institutes have lost nearly all their top scientists, he says. "It cannot be considered emigration, but evacuation."

Yet Ukraine has retained a few thousand active scientists. The crucial ingredient for their success, they claim, is funding from Western foundations or companies. "To be a pioneer, of course you need much more funding than the government is able to provide," says Krishtal. Last July he received one of three grants to Ukraine from the Howard Hughes Medical Institute. The 5-year grant pays Krishtal's lab $32,000 a year for 5 years, half of which goes to salaries for his 20-strong lab.

Other researchers take the commercial route. Galushko's five high-performance liquid chromatography (HPLC) systems—which would impress most Western chemists—were enough to win his eight-person lab contracts from Merck & Co. and Knauer to develop improved HPLC techniques. Such contracts "are how we can support ourselves," says Galushko. Sometimes an entire institute can catch a lifeline from the West. The 400-strong Hydromechanics Institute has $150,000 in contracts from the U.S. Defense Advanced Research Projects Agency, funneled through the Curtana Corp. in Arlington, Virginia. The funds are spent on projects such as fluid flow over dolphin skin and other elastic surfaces. "The future of my institute is connected to close cooperation with industry," says Director Viktor Grinchenko.

Efforts are under way to create a better environment for industrial support of science within Ukraine. For instance, the Dobrov Center for S&T Potential and Science History Studies, a think tank sponsored by the Ukrainian National Academy of Sciences, is spearheading a drive to establish 30 technology parks across Ukraine, to better exploit research. "If the technoparks stimulate Ukraine's economy, fundamental research will benefit because it's very industry-oriented," says Dobrov Center Director Boris Malitsky.

However much it is welcomed, Western funding is not a cure-all. Although Sergei Ryabchenko of the Institute of Physics won two Western grants, his lab is unable to use its nuclear magnetic resonance magnetometer because the institute can afford to provide neither the purified water nor the liquid helium that he needs. Because of such financial woes, Ryabchenko says, "we can't fulfill the conditions of our grants."

Galushko is not the only Ukrainian scientist who has an emergency plan in case his institute were to become so destitute that it had to bar its doors: His staff is prepared to move lab equipment to their apartments. "That's our last line of defense of good science," he says.

–R.S.

Ukraine's biologists as a pilot for the full-scale peer review. "We thought that surgery on ourselves, biologists, would be the best place to start," says Gleba. The goal of the review is "not to form a newly privileged elite, a new academy, but to form a community of people who will compete for the right to do research," says Krishtal.

But many Ukrainian scientists are outraged at the prospect of outside review. "This thing is foolish," says Kislii. "I'm an editor of the international journal *Ceramics*; why should someone analyze me?" Kislii says Ukraine can trim its scientific ranks without help from Western Europe. Moreover, he sees the peer review as a play by Storizhko to grab more power over science funding decisions—the planned competitive grants program would come under Storizhko's committee. "We have to create conditions where people can compete for grants, not receive money from Storizhko," he says. Storizhko, a nuclear physicist, dismisses such criticisms. "A lot of people who don't agree with this approach are afraid" they will wither under peer review, he says.

Other scientists fear the review because they worry that Western experts will fail to recognize the scientific potential of labs paralyzed by lack of funds. "We're not afraid of outside peer review per se, but that we won't measure up to Western standards" because our labs are underequipped, says Daniel Gluzman of the Kavetsky Institute for Oncology and Radiobiology Problems. Still others worry that basic researchers will try to swing the pendulum away from applied science. Krishtal, for one, admits he would like to even the score. "All the time during the communist era fundamental science was persecuted for lack of practical impact," he says. "Paton's primary wish was serving the military establishment."

A better solution than peer review, Kislii says, would be for the government to help institutes develop commercial activities through tax breaks or other incentives. For instance, Kislii says his Institute of Superhard Materials racked up as much as $5 million a year selling synthetic diamonds in the 1970s and 1980s. Now, however, the staff of the institute's diamond-producing plant has shrunk by 75%, and production has all but ceased. The reason for the decline, says Kislii, is steep taxes. He argues that scientific commerce should be exempt from taxes: "That's the only way out for science."

Storizhko and his reform-minded colleagues, however, plan to prescribe harsher medicine. But will Ukraine have the stomach to fire scientists identified as dead weight in a peer review? Such triage would be painful, but it's a matter of necessity, says Gleba. Ukrainian scientists, he says, "have to learn how to play the game" that Western scientists have been playing for years.

–Richard Stone