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EDITORIAL

Science in Russia

Science, in common with most aspects of life in the former Soviet Union, is in the center of a maelstrom, buffeted by changing currents of political, cultural, and economic forces in the several newly created countries. Science and scientists are caught between two opposing forces. Political freedoms brought by the lifting of the Iron Curtain have suddenly propelled the region's scientists into the world community. Freedom to travel, electronic mail, and the ability to work in the West have enabled some of the better scientists to forge unprecedented collaborations with colleagues abroad. Economic turmoil, however, has brought the area's research systems to the brink of collapse, and the threat of political instability hangs like the sword of Damocles over the future of science in the region.

Our previous special issues on Science in Europe concentrated on the western and central parts of the continent. In this issue, we stretch Europe's borders eastward to focus on science in Russia. We concentrated on Russia because after the breakup of the Soviet Union, Russia retained the lion's share of the science. The problems that now beset science in the other newly independent states are in most cases even more severe than those faced by Russian science. (For a view of the situation in Ukraine, see *Science*, 2 October 1992, p. 24.)

A series of news reports, coordinated by European News Editor Daniel Clery and European Correspondent Peter Aldhous, examines what is happening to six separate scientific disciplines: molecular biology, physics, space science, mathematics, astronomy, and earth sciences. *Science* selected these particular disciplines because each one tells a different story. Molecular biology, which was just beginning to flourish at the end of the Soviet era, is struggling, but some of the best groups are managing to remain productive. Molecular biology has the advantage that it does not require major capital investments or huge running costs for large instruments. Experimental physics, which has a long and proud tradition in Russia, does not have those advantages; it has been hit hard by budget cuts and some leading institutes are now barely able to pay salaries and electricity bills. International collaborations are the key to the survival of some of Russia's ambitious space science projects, and in this field new cooperative arrangements are being forged. For Russian astronomers, the difficulties caused by shrinking budgets are compounded by a unique problem: Many of the former Soviet Union's telescopes are in independent states that are in economic or political turmoil. Mathematics, widely regarded as one of the strongest disciplines in the former Soviet Union, has been badly weakened by the emigration of leading researchers. And earth sciences, which were isolated to a greater extent than most disciplines during the Soviet era, are being transformed as scores of Western groups, eager for access to prime research sites, strike up collaborations with Russian scientists.

A consistent theme that runs through the articles on each discipline is that international connections—both collaborations with groups abroad and grants from international organizations—are playing a pivotal role in enabling the best groups to continue doing science. Two Policy Forums emphasize this point. James D. Watson and Gerson S. Sher and Valery N. Soyfer, who are all associated with funding organizations established by financier George Soros, describe efforts to channel funds to the best researchers and science educators throughout the former Soviet Union.

Grants from outsiders, such as the Soros funds and the European Union–backed INTAS program, are, at best, stopgap measures. The future of science in Russia and the other independent states will only be assured when the governments of the region can themselves provide adequate support to the best groups.

In the interim the stopgap funds are providing a lifeline to keep the link between the past and a better future. The past was a mixture of first-class and third-rate science. Some areas of Soviet science were crippled by ideological barriers such as Lysenkoism in genetics and anti-plate tectonics in geology, and a top-down bureaucracy often stifled creativity. The outside money can be helpful not only in supporting science and scientists but also in introducing a democratic and investigator-initiated philosophy into the infrastructure. It is to be hoped that the newfound freedoms can be matched by the funds to welcome the new republics to the international community of science.

Colin Norman and Daniel E. Koshland Jr.