

depend."

He went on to express his sorrow for graduate students and postdoctoral associates in his field. "It is precisely the funding for this future leadership that is being cut most severely. Worse, the budget cuts mean that the entry level into our ranks, thin as it has been, is essentially to be wiped out for at least a year and that funding for new young people entering the universities from industry, government or postdoctoral positions is nonexistent." The last third of his editorial dealt with the struggles of "small science" to withstand the support of "super" projects by government agencies.

"The reasons for this trend are a bewildering variety of understandable factors," wrote Anderson, "including the desire of bureaucrats both for neat packages that they can micro-manage and for tangible reports in great quantities, the pork barreling tendencies of Congress and, to be sure, empire building among scientists. . . . The great democratic, individualistic system of peer-reviewed contract research that has been the source of

American eminence in science (the field where, most of all, America has 'stood tall' in the eyes of the world) has been allowed to collapse by simple default. Science in the United States is dying of giantism."

Anderson had sent a copy of his editorial to Bloch earlier with a letter that explained his angry declaration: "It represents my response to what seems to me a nearly total breakdown of communication between NSF and the research community. . . . From my viewpoint it seems as though NSF is attempting to destroy my science as an academic specialty."

On 11 February Bloch replied to Anderson. "Your letter and *New York Times* editorial attack the wrong targets!" Bloch began. "Scientists ought to be united in seeking public understanding and support for science and for increased funding of research. Instead, your editorial leaves the impression that a privileged group did not receive its entitlement. The impression, in a budget year that saw deep cuts in most discretionary Federal programs, will not win the scientific community any

sympathies." He ended by stating, "Rather than castigating NSF and other parts of the Administration, you would serve science better by using your influence with your colleagues and with the media to help develop the public and Congressional support needed to turn these budget requests into appropriations."

In an interview, Bloch said physicists had been the only scientists griping about the cuts in grants this year. "I'm not against high-energy physics or any other branch of physics," he said. "I could have used organic chemistry or biology in making my point that some agencies are not paying their share in basic research at a time when NSF appears to be the only candy store. Our shelves are being rapidly depleted of candy."

Bloch defended his agency's actions. "We are guilty of being cock-eyed optimists," he said. "We honestly believed we would get an increase of 15% to 17% on the way to doubling our budget in the next five years. We are just as disappointed and frustrated as our accusers."

—IRWIN GOODWIN

US & USSR ACADEMIES EXTEND EXCHANGES AS INDICATION OF THAW IN RELATIONS

After all the euphoria of the Reagan-Gorbachev summit meeting in Washington last December, it would be disappointing if some high spirits didn't spread to US-Soviet scientific relations. Indeed, on the first morning of the summit, on 7 December, while the leaders of the two superpowers mulled over the final details of their arms control treaty at the White House, eight prominent members of the Academy of Sciences of the USSR spent more than three hours with about 37 US scientists, engineers and industrialists rounded up by the National Academy of Sciences. The American participants were somewhat surprised to hear Abel G. Aganbegyan, a leading economist who is credited as a chief architect of *perestroika*, admit to Soviet failings in agriculture, housing, ecology and manufacturing, observe that science is "seriously behind the demands of life" and suggest that research would become the engine of his country's economic and social growth. Such *glasnost* led NAS President Frank Press to describe the encounter as "perhaps the most candid, informed and good-natured" discussion ever conducted by the US and USSR on technical matters.

In the event, Yevgeniy P. Velikhov, a plasma physicist who is a vice president of the Soviet academy, and Roald Z. Sagdeev, also a plasma physicist and head of the Institute of Space Research, were the only two visitors with durable relationships in the West. The others were economists, planners and legal scholars, and, like Aganbegyan, all relatively unknown to their US counterparts. For its part, the US side consisted of corporate research managers and some scientists, economists, historians, foundation heads and government officials. Neither group, in effect, had the kinds of people likely to be involved in scientific research exchanges covered by the new five-year agreement that Press signed with his counterpart at the Soviet Academy, Gury Marchuk, in Moscow on 12 January.

Suspended in protest

Though the signing ceremony made no news headlines or television spots, it was another conspicuous indication of the thaw in US-USSR relations. "It's a thrill to have our two governments talking about something besides missile throw weights," Senator Alan K. Simpson, a Wyoming Repub-

lican who champions a strong US defense capability, said recently at a Washington reception honoring a cultural agreement. The US had broken off most formal cultural and scholarly exchanges in 1980, after the Soviet invasion of Afghanistan. That same year the governing council of the US academy decided to suspend most scientific workshops with the Soviet Union as a protest against Andrei Sakharov's harassment by the KGB and his banishment to Gorky, a closed city 250 miles east of Moscow.

The first postwar exchanges of US and Soviet scientists took place in 1956, three years after Stalin's death. High-energy physicists from both countries described their experiments and their dreams at conferences in Moscow and at the University of Rochester. Washington's purpose in such events was stated in a recently declassified 1956 National Security Council directive that was printed by Yale Richmond, a veteran Foreign Service officer who specializes in East-West exchanges. As published in Richmond's book, *US-USSR Cultural Exchanges, 1958-1986: Who Wins?* (Westview Press, Boulder, Colorado), the NSC directive states: "To promote within Soviet Russia evolu-

NATIONAL ACADEMY OF SCIENCES PHOTO



Glasnost in science is welcomed in talks by Frank Press and Yevgeniy P. Velikhov (right).

tion toward a regime which will abandon predatory policies," scientific and cultural exchanges would transmit technical data, democratic ideas, possibly a craving for personal liberty and possessions (that is, for consumerism) and perhaps a way of transforming society. Richmond makes a strong case that such exchanges have freshened the currents of *glasnost* and *perestroika* that swept in Gorbachev.

To be sure, 1988 marks the 30th anniversary of a full-fledged exchange program. Formal academic exchanges began in 1958, after President Eisenhower called for a swap of 10 000 students with the Soviet Union. Though the US and Soviet academies signed their first exchange agreement that year, the trips didn't actually get under way until 1959. Some 20 000 American scientists and a similar number of Soviet scientists have participated in the program. Since the State Department's official suspension of exchanges in 1980, though, fewer than 30 scientists from each nation have taken part in academy programs each year. During 1983, for instance, 26 US scientists visited the USSR while 13 Soviets worked in the US. Nevertheless, exchange programs operated by the Department of Energy, the Environmental Protection Agency and the National Institutes of Health continued unabated during this period, and Soviet scientists could be found at Fermilab, the National Center for Atmospheric Research and Caltech's Jet Propulsion Laboratory.

In 1982, the existing interacademy exchange agreement expired, though *de facto* visits continued at a low level. As Federal funds for such programs dried up, NASA and DOE exchanges withered accordingly. By the end of

1984, scientific exchanges were at less than 20% of the level five years earlier.

A Trojan horse

It seemed that the Reagan Administration liked the situation that way. In 1984 George Keyworth II, then the President's science adviser, criticized collaborations and exchanges as a fig leaf for Soviet efforts to acquire militarily useful US technology. During a talk on the subject, Keyworth likened Soviet researchers working at US centers to the Trojan horse and claimed there were few benefits derived from the exchanges. Among the benefits, he cited the tokamak, though he added, "I often wonder if we wouldn't be better off if we hadn't adopted the concept and had pursued other avenues of fusion." Another outspoken critic of US-USSR scientific exchanges has been Richard N. Perle, until last year assistant secretary of Defense for international security policy. At a hearing of the House Science, Space and Technology Committee before he left the Pentagon, Perle argued that successive Administrations had failed to prevent the Soviets from literally stealing US technology through bilateral exchange programs. He described as one example the 1975 Apollo-Soyuz flight, the only collaboration between US and Soviet space programs. The Soviet program, said Perle, "continues to use the technology learned then for transferring their astronauts between two spacecraft."

Most experts in such matters disagree with Keyworth and Perle. Even Thomas B. Robertson, who is in charge of exchanges at the State Department's Soviet desk, said critics often confuse illegal trade actions, such as the Kongsberg-Toshiba epi-

sode, involving the sale of advanced submarine silencing technology, with legitimate and carefully screened exchange programs that have little or no potential for military usefulness.

Notwithstanding opposition from Keyworth and Perle, President Reagan told a Smithsonian conference on US-Soviet exchanges in June 1984 that he supported reviving not only the art of summitry but bilateral exchanges. In fact, he said, he was ready right then to negotiate exchanges of scientists, scholars and students. Even so, the exchange agreement between the academies was not reinstated until two years later, when a formal agreement was signed following the 1985 summit in Geneva.

January's agreement goes much further. It supersedes the 1986 two-year agreement (see *PHYSICS TODAY*, June 1986, page 67), which was due to expire in April. The new Agreement on Scientific Cooperation will be evaluated after two years to see what changes, if any, need to be made. In the initial years, exchanges of scientists will continue at the present rate—up to 50 person-months per year. But the accord calls for more exchanges of individual scientists if there is a demand by either side.

The agreement also speaks of an increased number of collaborative research projects and scientific workshops on a wide range of subjects. The statement released jointly by the academies lists among the topics chosen for workshops in 1988–89 nonlinear systems in earthquake prediction, lasers in photochemistry, dynamical symmetries and supersymmetries, planetary sciences and astrophysics. Cooperative research will be continued or initiated on such matters as condensed matter theory, geological evolution of the Earth, Arctic geosciences, energy conservation and nuclear reactor safety.

Press is enthusiastic about promises made by Soviet academicians for the new exchange program. These include facilitating access by US scientists to laboratories and universities not associated with the Soviet academy and a planned four-week summer workshop for scientists under the age of 30. The inclusion of younger scientists is unprecedented for the Soviet Union, where the average age of academicians dropped by about five years after the academy elections in December; it is now around 65. General Secretary Gorbachev has stated publicly that government officials and institute heads should retire at 65.

—IRWIN GOODWIN ■