China-U.S. Science Cooperation Blooming

In the cause of modernization, Chinese undertake exchanges of students, scholars, and joint research

During his recent visit to China, President Reagan announced a nuclear cooperation agreement that could give the Chinese extensive access to U.S. nuclear technology (*Science*, 11 May, p. 582). Less noticed were his references during the trip to other science and technology agreements that are already a fluorishing feature of China-U.S. relations.

An estimated 10,000 Chinese students and scholars are now in this country under the agreements. The number of intergovernmental protocols in science and technology has risen to 22. And the Chinese have increased the volume and variety of science and technology activities by forging arrangements with U.S. industry and professional organizations outside the formal agreements.

On balance, the China-to-U.S. traffic in students and scholars under these agreements has clearly been heavier than the reverse flow. A U.S. decision was made early that reciprocity would be defined differently than it was, for example, in the agreements on cooperation in science and technology with the Soviet Union. With the Soviets, a precise person-for-person, month-for-month exchange came to be the rule. In respect to China, the U.S. working rule has been that cooperation, on balance, benefits the United States. As President Reagan's science adviser George A. Keyworth, II, put it in testimony before a House Foreign Affairs subcommittee last August, "It's in our fundamental interest to advance U.S. relations with China—and cooperation in science and technology is essential to that relationship."

Cooperation has taken two main forms—exchanges of students, scholars, and research scientists, and joint research projects. Before diplomatic relations between the two countries were reestablished in 1979, the Committee on Scholarly Communication with the People's Republic of China, based in the National Academy of Sciences, played a key role in the rapprochement in science. Observers say that meetings between senior U.S. academic scientists and their Chinese counterparts were influential in shaping the exchanges.

Of the roughly 10,000 Chinese here under the exchanges, about two-thirds are students and the rest visiting scholars. The impression is that the proportion of students is increasing. According to David M. Lampton, an Ohio State Sinologist on leave with the Academy's China committee, the disciplinary makeup of the group also has progressively broadened. The first group of students were concentrated heavily in the basic sciences. Subsequently, a greater interest in the applied sciences and engineering became evident. And, recently, more students have pursued studies in economics, finance, management, and the social sciences. This is attributed to a Chinese realization that such skills are needed to deal with problems of development and international finance.

As a sign of the practical turn the relationship has taken, the U.S. Academies of Sciences and Engineering in February jointly signed an agreement for a new Science, Technology and Economic Program of Cooperation with China's production ministries. The first major activities will bring together U.S. and Chinese scientists and engineers for seminars on reducing crop losses, coal use, and transfer of technology to production.

NAS

NAS president Frank Press (seated right) and NAE president Robert M. White flank China's state science committee vice chairman Zhao Dongwan at January signing of new agreement.

The costs of the education exchanges are substantial. Currently, half the students are estimated to be supported by the Chinese government and half by nongovernment patrons. Private support comes mainly from a mixture of foundation funds and scholarships and with a substantial portion emanating from sponsors of Chinese background in this country or elsewhere outside China, many of whom finance students who are relatives. Chinese graduate students are also strongly encouraged by their government to obtain support through teaching and research assistantships.

The Chinese government has given a high priority to the exchanges and directed substantial amounts of scarce foreign exchange into them. An important source of funding has been a series of loans for education through the World Bank. Two-thirds of an initial $200-million loan was earmarked for purchase of scientific equipment for 28 Chinese universities counted on to assume greater responsibility for teaching and research in science and technology. The balance was designated for faculty development, including support for the exchanges. Two subsequent loans for $84 million each, one for agriculture education, the other for the development of polytechnics and an existing television university, are similarly divided. And all require substantial Chinese matching funds.

While the exchanges are building rapidly, the Chinese lag far behind the countries sending the most students to the United States. An Institute of International Education survey for 1982–1983 showed that Taiwan had over 20,000 students here. Iran continued to have the biggest contingent—26,000.

The other major dimension of Sino-U.S. cooperation in science and technology—joint research projects—has been primarily organized and funded under the intergovernmental agreements. These have generally taken longer to get under way. From agreeing on a subject of mutual scientific interest to identifying specific areas of research and thrashing out the details of how to proceed may take 3 or 4 years and many are now in early stages of implementation.

A chronic problem on the U.S. side with bilateral science and technology programs is that they are created by Executive Order and lack legislative sanction and, therefore, annual congressional appropriations. As a result, funding for bilaterals has to be wrung out of

the regular budgets of the agencies. The agencies usually manage to eke out funds for administrative costs and travel expenses, but the U.S. share of joint research must be funded in the free-for-all competition for federal research funds.

The National Science Foundation (NSF) has therefore played a special role in science bilaterals. NSF's annual spending on international science cooperative activities has been running at about $10 million, of which $1.5 million—the largest dollar share for any single country—currently goes to China.

While Sino-American cooperation is booming, the relationship is not without difficulties. There are U.S. qualms that the Chinese government underfunds its exchange students, for example, but most of the frictions seem to arise in other areas. Reciprocity has been an issue, for example, in negotiations over an agreement on the exchange of technical information. The U.S. agency involved is the National Technical Information Service (NTIS), which disseminates technical reports on research funded by the federal government. The Chinese have taken full advantage of access to NTIS services, becoming the second biggest user nation after Canada with a standing order for two microfiche copies of virtually everything NTIS publishes.

When the agreement came up for renewal, U.S. officials complained that the United States did not have access to comparable Chinese material, but, in effect, was simply permitted to subscribe to Chinese journals and similar publications. The discussion is still in progress.

Similar complaints have been raised by other U.S. agencies about the inability or unwillingness of the Chinese to provide access to particular people or information. Some Americans think that the Chinese persist in equating requests for information with spying.

There have, however, been improvements in Chinese flexibility in dealing with U.S. requests, particularly since the Chinese government decentralized authority to make arrangements under the protocols. American observers also say that the Chinese have been most freewheeling in seeking cooperation with U.S. professional organizations, industry groups, and individual companies.

At this point, at least, there is agreement on both sides that the relationship is thriving. As a U.S. industry observer put it, borrowing one of those lyrical Chinese nature similes that Americans seem to find irresistible, cooperation is growing "like bamboo shoots after the spring rain."—**JOHN WALSH**

Mistrial Is Declared in Mechanization Case

A legal challenge to farm mechanization research at the University of California has ended in a mistrial because the presiding judge became seriously ill. A new judge was assigned to the case on 16 May and trial proceedings at Alameda Superior Court in Oakland, California, are expected to start all over again in the fall.

The court ruling was a major setback for the group that filed suit against the university in 1979. After 5 years of legal skirmishing with the university, California Rural Legal Assistance, an advocacy group representing the California Agrarian Project, finally got its day in court this spring. The lawsuit charges that the university improperly spent public funds for mechanization research that allegedly benefit only agribusiness and violated federal land-grant acts as well. The implications of the case, however, are broader, raising questions about the social costs of innovation (*Science*, 30 March, p. 1368).

The trial, which began on 12 March, was suspended in mid-April when Judge Spurgeon Avakian was stricken with a respiratory ailment. At that point, the advocacy group had presented nearly half its case and laid out its legal strategy in the non jury trial. William Hoerger, an attorney for the legal group, expressed disappointment with the decision, saying that he had been pleased with the progress of the trial. Although university lawyers now have the advantage of knowing the group's approach to the case, Hoerger said, "I can't see changing our strategy."

Gary Morrison, lead attorney for the university, said that he hopes to persuade the new judge, Raymond Marsh, to throw out the case entirely, but added that the chances of success were slim. Morrison said the university, at the very least, will ask Marsh to narrow the scope of the lawsuit before the trial begins. The university filed similar motions under Avakian but was largely unsuccessful. Marsh is expected to meet with the two parties within the next few weeks.

Shortly before the trial was suspended, the university revealed a list of 16 expert witnesses who were to testify on its behalf. Assuming that the case goes to trial, the advocacy group will be taking their depositions during the summer.—**MARJORIE SUN**

Formaldehyde Issue: Back to Square One

The Environmental Protection Agency (EPA) announced last week that it will consider whether formaldehyde should be further regulated and classified its review of the chemical as a top priority. The decision represents a reversal of a 1982 ruling by EPA under Anne Burford.

The formaldehyde issue has run full circle under the Reagan Administration. Just before Burford took office, agency officials recommended that formaldehyde—a ubiquitous chemical found in products such as particle board, plywood, and permanent press clothing—should be designated a priority for regulatory review. Animal studies had shown that the chemical causes cancer at relatively low doses. But former head of EPA's toxic substances office John Todhunter ruled in 1982 that formaldehyde did not merit this classification. Critics of his decision charged that Todhunter had been unduly influenced by industry and last year, the Natural Resources Defense Council challenged Todhunter's decision in a lawsuit against the agency.

EPA's new decision brings the agency back to the same point in the regulatory process as when the Reagan Administration took office. The agency said it is giving priority to formaldehyde since a large number of people are exposed to the chemical, particularly workers who handle formaldehyde-treated fabric and people who live in homes constructed largely from plywood and particle board—such as mobile homes.

The agency must now decide whether formaldehyde poses to humans a significant risk of cancer, gene mutations, or birth defects. At the same time, the agency has announced that it will consider ways to regulate the chemical. None of these actions, however, guarantees that the agency will actually follow through with regulations, but the priority designation sets in motion the review process.