Senate Commerce Committee authorization bill report to come up with a plan that defined more clearly how such a joint venture would fit in with the agency's measurement mission and would give the endeavor a national rather than a local focus. A revised proposal is now in committee hands, but Senate staff sources say that approval of the project is by no means assured.

On the University of Maryland side, CARB was seen as fitting into a larger scheme as one of four separate institutes making up a comprehensive biotechnology initiative. The other institutes would be devoted to marine, medical, and agricultural biotechnology. As the first, however, CARB raised new issues. For example, the proposal apparently prompted the state board of higher education to seek assurances that the university was not taking unilateral action affecting academic credit and degrees over which the board has authority. But the major effect of CARB on the university stems from the recognition that existing policies were not adequate to cover participation in a joint venture in which the purposes of the various partners differ. A range of issues from rules for appointment to the staff of the center to dealing with patents and proprietary rights are under discussion. And the prospective partners are still working out a financial plan to govern industry affiliation. There is optimism among university officials that these prenatal problems can be worked out, but also a view that, as one of those involved put it, "We're trying to develop a new set of relationships. It's fair to call it an experiment."

Maryland went through something of a dry run on policy reformulation earlier this year when it vied for the Software Engineering Institute, which Carnegie-Mellon was selected to manage. During the competition period there were objections from Maryland faculty and students about the prospect of university involvement in secret research for the military. This raised echoes of the Vietnam protest era when several interdisciplinary research centers became targets of activists. There are faint rumblings of such protests on U.S. campuses now, and some so-far mild objections to the use of public resources represented by the universities for corporate advantage. But at this point, the main concern seems to be to protect the traditional university values and interests. And to do this, university officials with the most experience in this sphere emphasize that it is essential for universities entering new joint ventures to get the terms right.—**JOHN WALSH**

Garrison Compromise Proposed

A congressionally mandated commission, after 4 months of study, has submitted recommendations for substantial revision of the Garrison diversion project, a controversial irrigation program in North Dakota that environmentalists have been trying to scuttle for years (*Science*, 31 August 1984, p. 904).

The commission, manned mostly by western Republicans, has come up with a plan that at $1.1 billion is no cheaper than the original, but which would include $401 million in new money for industrial and municipal water delivery systems. Total irrigated acreage, authorized at 250 million, would be reduced to 130 million, including 17 million acres of Indian reservation to compensate for Indian lands inundated by the Garrison Dam in 1953.

The compromise would satisfy Canadians, who have expressed strong concerns about the transfer of Missouri River biota to the Hudson Bay watershed, by concentrating most of the irrigation in the James River watershed.

The commission calls for a halt to construction of the Lonetree Reservoir, the heart of the network, and its replacement by a canal. It states that the area, which contains a wildlife refuge, should be managed for wildlife but not put off bounds for future irrigation needs. The panel recommends permanent preservation of Kraft Slough, a prized habitat for migratory waterfowl and other species, which was scheduled to be inundated for a reservoir. It also advocates the formation of a panel of experts to oversee wildlife mitigation efforts.

The new proposals would rescue the project from a political stalemate. North Dakota politicians have been defending it fiercely for years despite declining public and congressional support. For the past few years plans have been limited to building "phase 1," which contains most of the costly and environmentally destructive infrastructure but which is only designed to irrigate 85,000 acres.

The Bureau of Reclamation is now free to proceed with the parts of the plan that are already authorized. Interior Secretary William P. Clark is expected to submit a request for those requiring congressional action by 15 February.

The commission exercise represents a unique solution to a major public works conflict. Environmentalists in North Dakota, who wanted the project deauthorized, are unhappy with the outcome. But the Audubon Society, leader of the anti-Garrison crusade, has expressed willingness to live with the modified plan, which it says reflects a more realistic response to the state's water needs.

—**CONSTANCE HOLDEN**

Industry-Academia Cooperation Touted

An extremely positive account of university-industry research projects is offered by the National Science Foundation (NSF) in a new report on its Industry/University Cooperative Research projects program (IUCR).*

The program, in operation since 1977, is "one of a very few federal efforts to create explicit bridges between the world of academia and the world of commerce," says the NSF, and there is little information on what makes such arrangements work.

So NSF mailed out 20-page questionnaires to 226 scientists working on 118 joint projects funded from 1978 to 1980, which covered basic research on subjects ranging from computer language systems to filtration processes.

The industry and university scientists showed broad agreement on the goals of research ("develop patentable products" was the most important) and were very pleased with its quality and with the synergistic effects of cooperation.

The report says the most important variables contributing to the success of the projects were "those related to interpersonal interaction." Most of the scientists involved represent the crème de la crème—senior professionals in major research universities and Fortune 500 companies. Collabo-

*"Cooperative Science: A National Study of University and Industry Researchers," from the Productivity Improvement Research Section, Division of Industrial Science and Technological Innovation, National Science Foundation, Washington, D.C. 20550, November 1984.

rations were based on extensive networks of preexisting professional and social contacts. The report indicates that these relationships, as well as continuous rounds of phone calls and "bull sessions" were "particularly crucial for these cooperative projects."

The report, which contains nine case studies, also notes that collaboration often resulted in "changes in the nature of the science"—that is, in topics or methodology. Indeed, it says "the cases are replete with admissions by mature scientists of how their perspectives on their science had changed."

The NSF review provides timely reading for budget-makers. It quotes a university scientist to the effect that the IUCR program "is probably one of the most important things that NSF could do because [our] future is probably the future of the industry." An industry scientist lauds one project as "absolutely necessary" but difficult for industry to fund alone. "This is precisely where the Federal Government funding agencies should contribute," he says.—**Constance Holden**

Press Calls for End of Special Lobbying

National Academy of Sciences president Frank Press has called upon all Academy members to join forces in an effort to combat a growing trend for universities to gain funds through pork barrel politics. During the past 2 years or so, a handful of universities have received special funds for buildings or laboratories by enlisting the aid of Washington lobbyists who, in turn, have successfully pressed the universities' case in Congress (*Science*, 31 August 1984, p. 910).

In a letter to Academy members, Press warns that if the pork barrel approach continues, "the possibility of undermining the evaluation and review system that has been responsible for the great strength of American science will become a reality. . . . It is in the long-term interest of a strong American science to use procedures that we all respect, and to resist special-interest political favoritism that can only hurt the overall scientific endeavor," he wrote.

—**Barbara J. Culliton**

New Curriculum at Harvard Medical School

An experimental medical curriculum, intended to enhance teaching of the "caring" aspects of medicine, will be initiated next fall at Harvard when 25 of 165 new students become part of the Oliver Wendell Holmes Society. Each year thereafter, an increasing number of entering medical students will be enrolled in the Holmes Society, named in honor of one of Harvard's most distinguished 19th century deans. Planning for the new curriculum began in May of 1983.

The innovative Holmes curriculum will emphasize teaching the "concepts which underlie each discipline and specialty, rather than acquisition of all the known facts," according to a Harvard announcement. In addition, Harvard promises that in the new program, "The large, necessarily more passive lecture will be de-emphasized in favor of small group discussions, case studies, self-paced learning, and training in the observational, analytical and quantitative skills." Computers, provided through a 5-year, $5-million grant from Hewlett-Packard, are also to be part of the "new pathway" approach to medical education, offering a means for students to learn from simulations of biological and diagnostic processes, for example, as well as a way of teaching them to recognize visual patterns of normal and abnormal cells.

An early exposure to patient care is cited by Harvard as another innovative step in building on a student's sense of caring for the sick. "Patient care experiences will form an integral part of the Holmes Society curriculum from the very first weeks," the announcement says.

The experimental curriculum follows in close measure the prescription for educating "humane" physicians that was written recently by the Association of American Medical Colleges in a study called "Physicians for the Twenty-First Century" (*Science*, 26 October, p. 419). Harvard Medical School dean Daniel C. Tosteson was a member of the panel that prepared that report. He calls the Holmes experiment "a major transformation of how we teach and the way students learn."—**Barbara J. Culliton**

Monsanto May Bypass NIH in Microbe Test

The Monsanto Company is planning to ask the Environmental Protection Agency (EPA) for clearance to conduct a field test of genetically engineered microbes on corn plants, bypassing the traditional approval process by the National Institutes of Health (NIH). Monsanto expects to submit its request late this month. The company is breaking new ground with the planned experiment in terms of federal regulatory process and genetic engineering.

Companies traditionally have sought approval by an NIH advisory committee before proceeding with such field tests, although only federally funded institutions are required to do so. But the NIH approval process concerning deliberate release experiments has become mired in a lawsuit brought by Jeremy Rifkin. Monsanto has now chosen to go directly to EPA, which under federal law oversees the use of pesticides, including microbial pesticides. At a press conference on 10 December, Monsanto did not explicitly rule out applying for approval from NIH, but an official said that the company would follow the wishes of EPA. EPA has been developing its own regulatory guidelines concerning biotechnology products.

The company plans to test a microbial pesticide that will protect the roots of corn plants against black cutworm. The organism represents the first application to EPA to conduct a test in the environment of a genetically modified microbe. At the press conference, company officials for the first time described the organism and the experiment in detail, although bits and pieces of information about the work have been circulating since August. Company scientists have isolated the gene of *Bacillus thuringiensis* that causes bacteria to produce a toxin lethal to cutworm. The gene has been inserted into *Pseudomonas fluorescens*, a microbe that commonly lives on the roots of corn plants. When the cutworm attacks the roots, it ingests the bacteria and dies.

The EPA has 90 days in which to approve or disapprove the experimental proposal by Monsanto after it is submitted.—**Marjorie Sun**