Academe and Industry Debate Partnership

A conference on university-industry ties acknowledged problems for academic freedom but found little enthusiasm for new rules

The Academic-Industrial Complex

This is the seventh in a series of occasional articles about the emerging relationships between industry and universities.

Concern about the propriety of university-industry relations has been a central theme on the country's research campuses for the past couple of years. Researchers, particularly in biotechnology, are avidly pursuing corporate support while simultaneously worrying about the ethical dilemma that arises as they surrender a certain amount of academic freedom in the bargain.

Last month, at the invitation of eight university presidents, more than 400 academic and corporate leaders gathered at the University of Pennsylvania for a "national conference on university-corporate relations in science and technology."* It was the second prominent meeting on the subject this year and was the first time so many of the key players on both sides were assembled in one place. The meeting, which had a certain consciousness-raising element to it, was more an occasion for the restatement of general principles about academic values† and corporate goals than a time for hard, detailed analysis. A number of satisfied participants observed that the significance of the conference lay not in what was said in formal speeches but in the fact that so many people cared enough about the issues to attend.

Participants at the invitation-only conference were more or less equally divided between academic and business, engineering and biology. Although by far the majority of university-industry research ties are in the engineering and computer sciences, it is industry's apparent invasion of university biology laboratories that has been the real focus of academic and public concern. In part, this is because a handful of recent contracts, including those between the Massachusetts General Hospital and Hoechst AG for $70 million (*Science*, 11 June, pp. 1200–1203) and Washington University and Monsanto for $23.5 million (*Science*, 18 June, pp. 1295–1296), involve such substantial sums of money. In addition, public concern about the application of research in genetic engineering, which most of the recent biology contracts are about, puts biotechnology in the limelight. Indeed, the current debate is reminiscent of the debate surrounding the advent of research in recombinant DNA.

The question at hand is whether academic researchers can enter into contracts with industry without sacrificing important university values. "The compromise before us is fairly clear," Herbert I. Fusfeld declared. "As the university moves closer to a partnership with industry, more resources can become available, but the university relinquishes some of its unique capabilities for unrestricted exploratory research and freedom of action, said Fusfeld, director of the center for science and technology policy at New York University (NYU). "There are no absolutes, and the issue becomes one of degree and common sense," Fusfeld observed, stating a view that is widely shared in the academic community where existing university-industry contracts take many forms.

Others, including Representative Albert Gore, Jr. (D–Tenn.), would like to see the rules more specifically drawn. In prepared remarks delivered at the conference by an aide, Gore called for yet another meeting to be "convened for the purpose of setting some precise guidelines that would protect the interests of both the universities and the companies involved."

The first major university-industry conference was held last March, when five university presidents, lead by Donald Kennedy of Stanford, invited some 30 academic and corporate leaders to a retreat in Pajaro Dunes, California, to debate the principles that should govern contractual ties between university researchers and industrial sponsors‡ (*Science*, 9 April, pp. 155–158). The Philadelphia meeting was Pajaro Dunes on a grander scale. Both groups concluded that university-industry collaboration is good—good for universities, good for business, good, in the name of technology transfer, for the United States. Furthermore, the collaboration can be made to work if each partner recognizes the legitimate needs of the other, namely, open communication for academics and patents and profits for corporations. The greatest problem at present, IBM vice president Erich Bloch said in Philadelphia, is "inflated expectations on both sides."

Indeed, the limits to university-industry collaboration are becoming apparent. As several persons have pointed out, industry spends somewhere between $250 million and $300 million a year on research and development in universities. That is less that 4 percent of its total R & D investment, which says that industry is in no way a substitute for government funding of basic research. But more than that, the money industry does spend in academia is concentrated on a relatively small number of research institutions. Referring to data collected at NYU, Fusfeld noted that neither government nor industry distribute R & D funds evenly. "There are some 200 institutions that can be referred to as 'research' universities," he said. "Of these, 100 account for 85 percent of all federal funds going to university R & D efforts. The top 10 universities account for 25 percent of these funds." In industry, "Ten companies account for one-third of all R & D funded by industry. Two companies alone provide 20 percent of all the basic research funded by industry." Further information about the characteristics of the university-industry partnership emerged from an NYU study which showed that of 465 industry-supported research programs, 67 percent were in engineering and computer sciences and only 14 percent in biotechnology. In 75 percent of cases, cooperative research programs are established on the basis of a previous consulting arrangement between the principal university researcher and the corporate sponsor, and in the "overwhelming majority" of cases, the programs are initiated by the university. "While industry is receptive,

*"Partners in the Research Enterprise: A National Conference on University-Corporate Relations in Science and Technology," was held at the University of Pennsylvania, 14–16 December 1982. The hosts were the presidents or chancellors of Cornell, Johns Hopkins, Princeton, Washington University, Yale, and the Universities of Michigan, Pennsylvania, and Texas.

†Yale University president A. Bartlett Giamatti outlined the issues in the keynote address. A version of his remarks was published in *Science*, 24 December. pp. 1278–1280.

‡The Pajaro Dunes conference was organized by the presidents of the California Institute of Technology, Harvard, the Massachusetts Institute of Technology, Stanford, and the University of California.

it is clear that the university is selling, not receiving," Fusfeld said. "Several notable recent exceptions in biotechnology do not change the overall picture."

It is those notable exceptions, however, that are at the heart of the present public debate over the propriety of industrial sponsorship of university research. Representative Gore made the point in his prepared remarks. "While the increasing ties between universities and private companies in general give me some cause for concern, such arrangements involving biotechnology research have received special attention because of the uniqueness and power associated with genetic engineering," he said. Gore cited the recent Massachusetts General-Hoechst and Washington University-Monsanto contracts as being among those that deserve continued scrutiny.

". . . I do see several potentially negative aspects of these relationships that I think need to be fully debated. And in some cases, alternative arrangements need to be explored before these new arrangements set precedents that may be injurious," he said.

Among members of Congress, Gore has taken a particular interest in the academic-industrial complex. The House subcommittee on investigations and oversight which he chairs has held several hearings on the subject and reviewed a number of contracts in detail. "The subcommittee will soon be issuing its report," he said. "We concluded that faculty should not hold equity positions in commercial ventures that coincide with their academic endeavors," he reported. "We will recommend that 'middleman' mechanisms be further developed, such as the North Carolina Biotechnology Foundation, recently established by the state of North Carolina to accept industrial contributions for university-based research." And he stated the subcommittee's desire for a guideline-writing national conference in the "tradition of the first Asilomar gathering" at which guidelines for recombinant DNA research were drafted in 1975.

But it is clear from both the Pajaro Dunes and Philadelphia conferences that neither universities nor corporations are eager for national guidelines. Rather, both sides favor a pluralistic approach that takes into account the differing circumstances in which contracts are negotiated. To date, several major research universities have drawn up their own sets of guidelines covering such matters as patent policy, publication rights, and disclosure by faculty of their corporate ties. Most of them are hoping this will be sufficient.—**BARBARA J. CULLITON**

Congress Ducks the MX

Funds provide for test missiles only; decision on Dense Pack basing put off

The 97th Congress, faced with a difficult choice on the fate of the MX nuclear missile, decided at the end of December essentially to set the matter aside. After a fierce debate, it settled on a provision in the massive budget bill that neither sanctions the controversial missile nor does it irreparable harm. The language agreed to by House and Senate conferees ensures only that yet another acrimonious debate about the MX and its optimum basing mode will occur this spring.

President Reagan, in a statement on 21 December, said that the bill was disappointing because it failed to include $1 billion for construction of the first five operational MX missiles. He signed it anyway, however, because it provided funds for the production of 20 test missiles, some of which could be used as operational missiles, according to language added to the bill just before it was approved. The language "does enable us to keep to our schedule for initial deployment in 1986 once the Congress approves a permanent basing decision," Reagan said.

No firm conclusions about a basing mode were reached during congressional deliberations. Dense Pack—the system of closely spaced missile silos proposed at the end of November—failed to attract much support, despite aggressive promotion by George Keyworth, the White House science adviser. Keyworth made a number of claims on behalf of Dense Pack that were contradicted by other Administration experts and consultants, and may have added to the confusion.

Keyworth told a Pentagon press conference, for example, that a system of ballistic missile defense to protect Dense Pack will not be needed until after the year 2000. When a reporter noted that even the Air Force acknowledges the need for a missile defense by the mid-1990's, Keyworth said, "Then I fundamentally disagree with the Air Force." Keyworth also asserted that the MX, when deployed in Dense Pack, would survive for "many, many hours," a viewpoint challenged by several experts. William Nierenberg, a member of the Defense Science Board, says, for example, that the MX would probably survive for 2 hours and certainly no more than 3 hours. Finally, Keyworth said that he does not believe the MX would "subject Soviet defenses to a threat that reduces their deterrent." To the contrary, Air Force General James McCarthy recently testified to Congress that with the MX in Dense Pack, "we put hard targets [such as Soviet missile silos] at risk which is the principal reason why we need the MX missile."

Congress tried to sort through the technical aspects of Dense Pack, but ultimately gave up. It approved the expenditure of $215 million for missile basing research but withheld another $560 million until spring, when a final decision is to be made. The Air Force says that this provision does not inhibit its work at all because the extra money will not be required before then anyway. The value of the deferral was apparently to provide the opportunity for a symbolic expression of fiscal restraint.

Instead of resolving the confusion itself, Congress ordered the President to produce another missile basing report, no earlier than 1 March. The report is supposed to address in detail the merits and drawbacks of Dense Pack, as well as to reconsider a host of basing alternatives that have been circulating for the past 15 years. Congressional advocates of road-mobile, multiple protective shelter, land-and-sea, deep underground, and submarine basing succeeded in attaching these ideas to the list of required topics. The President is also to examine the prospect of a missile larger or smaller than the MX. To help in this endeavor, Reagan has appointed yet another panel of experts—this one composed mostly of former government officials. The panel, which must complete its work by 18