The antisporozoite vaccine used in the Maryland trials was produced by Hoffmann–La Roche based on work done by a research team headed by Ruth and Victor Nussenzweig at New York University Medical Center. Prospects for manufacture of the vaccine were clouded for a period (*Science*, 4 February 1983, p. 467). The World Health Organization objected, expressing misgivings about patent rights, when Genentech, a biotechnology firm in South San Francisco, expressed interest in gaining an exclusive license to produce the vaccine. Hoffmann–La Roche subsequently obtained a license as prospective manufacturer of the vaccine and AID sources say that an agreement was made providing for preferential pricing of the vaccine for both AID and WHO that both organizations find satisfactory.

If field trials of a vaccine aimed at falciparum sporozoites are successful, a further trial phase aimed at developing the vaccine as a public health tool would be necessary. Such matters as dosages and frequency of shots would have to be established. It is expected that commercial companies would then be interested in producing a falciparum sporozoite vaccine. Such a vaccine would protect tourists and military personnel against infection with that type of malaria. A merozoite vaccine, however, would be required to protect people already infected with malaria from recurrences of the disease.

James Erickson, project manager for AID's malaria program, says that a vaccine active against sporozoites would be an important advance, but would represent only a first step toward developing what AID envisions as a satisfactory vaccine. The goal, says Erickson, is a polyvalent vaccine, a "cocktail" effective against different forms of the parasite and all types of malaria—malaria in humans is of four main types. Developing a fully effective, polyvalent vaccine is likely to take a decade, says Erickson. ■

JOHN WALSH

Chip Makers Plan Research Center

Leaders of the U.S. semiconductor industry announced on 5 March that they will invest jointly in a major new center to improve their manufacturing skills and make their products more competitive.

They have not fixed the cost of the project, to be known as "Sematech," an acronym for Semiconductor Manufacturing Technology Institute. If it adheres to the recommendations made by a recent Defense Department inquiry (*Science*, 15 August 1986, p. 712), the cost will be over $1 billion, perhaps $2 billion. Although all member companies will contribute, a spokesman for the Semiconductor Industry Association said, a major share will have to come from the federal government.

Charles E. Sporck, president of the National Semiconductor Corporation, formally unveiled the plan in Washington last week. His announcement came after a long and intense debate within the industry over what should be done to make U.S. companies more competitive. It is a sign of independence, Sporck said, that the companies have not come to Washington seeking help until now.

The internal debate focused on what should be put in the new facility. Some smaller companies wanted to install a high-volume production line at Sematech and get International Business Machines to promise to use its output. IBM reportedly declined, although it did agree to contribute a large share toward the new venture. Others wanted to focus on methods for rapidly introducing new designs into production, leaving the manufacturing to be done by individual companies. This view seems to have the upper hand.

Sporck said it will take until June to work out an operating plan. By then, Sematech should have a director, a site, an agenda, clearance from the antitrust division of the Justice Department, and a funding goal. None of these exist now. It is clear, however, that Sematech will focus on production equipment and large-scale manufacturing techniques to make commercial, not military, products.

This move is the latest in a series of steps taken by U.S. silicon chip companies to strengthen their position in the world market, which is eroding rapidly. According to Charles Ferguson of MIT's Center for Technology, Policy, and Industrial Development, the U.S. companies are headed on a decline that will not be reversed easily. He said in testimony to a Senate subcommittee on 26 February that Japanese efforts on x-ray lithography, "which will probably dominate semiconductor production by the mid-1990s, dwarf those of the United States." Japanese companies are already on a par with or ahead of U.S. companies in gallium arsenide research, laser systems, and optoelectronics. Unless there is a drastic change in the rate of investment in research and development in the United States, he expects to see "the deterioration of this quintessentially strategic industry." ■

ELIOT MARSHALL

Science Policy Programs Progress

The study of the impact of science and technology on public policy took root in academe in the late 1950s and early 1960s. A new survey, "Graduate Education and Career Directions in Science, Engineering and Public Policy,"* reports that the field has prospered modestly but still faces some of its original problems.

The survey sponsored by the AAAS Committee on Science, Engineering, and Public Policy focuses on 21 programs† that provide professional training. It goes beyond previous inventories by reporting the results of a survey on how alumni of the programs have fared professionally.

Responses from about 550 of the 1500 alumni of the 21 programs show that, for many of them, their graduate training did lead to employment in their field and in jobs that many deem satisfactory. The principal employer from the start has been government, particularly the federal government.

A major hitch is that the alumni of the programs continue to have a professional identity problem. The report notes that there is "no single professional association or journal which might foster linkage among the graduates." And, so far, the field lacks a common curriculum. Therefore, as the report puts it, the enterprise lacks legitimacy in the academic world and prestige among employers.

As has been true from the start, the programs are divided sharply between those based in social science departments and those in engineering schools or departments. The latter require their students to have technical backgrounds—usually bachelor's degrees in science or engineering. The social science–based programs generally do not. Curriculum in the engineering-based programs typically stresses a quantitative approach (attempts at scientific methods of policy analysis), while the social science–based programs emphasize the qualitative, case study, approach. In both types of program, the master's is regarded as a professional degree and the Ph.D. as leading to academic employment or research.

While a few of the programs have gone

*Available from the AAAS Sales Office. $10.

†Institutions with programs in the survey are American University, Boston University, Carnegie-Mellon, Cornell, Dartmouth, Eastern Michigan, George Washington, Georgia Tech, Harvard, Indiana University, MIT, Rensselaer, Stanford, Syracuse, University of Denver, Michigan, Oklahoma, University of Texas at Austin, Vanderbilt, and Washington University.

under, most have endured and their number has modestly increased in recent years. In most cases, the programs were established with financial help from federal agencies or private foundations, notably the Sloan Foundation, but have successfully made the transition to reliance on institutional support as federal funding and other outside funding have declined.

The progress report on science and engineering and public policy programs seems to be that they have established an academic niche for themselves and made a tangible contribution to the process of making public policy. But as AAAS executive officer William D. Carey observes in his foreword to the report, "neither a recognizable field nor an organized profession has yet emerged." The report winds up with a series of recommendations, which mainly urge the programs to do a better job of collaborating to fill these gaps. ■ JOHN WALSH

Glenn Asks Reagan to Halt Pakistan Aid Pending Review of Nuclear Programs

President Reagan has been asked to immediately suspend all military aid to Pakistan pending the outcome of a "thorough review" of Pakistan's nuclear research program. The request was made on 5 March by Senator John Glenn (D–OH), chairman of the Committee on Governmental Affairs in the wake of reports that Pakistan has an atomic bomb or all the components needed to assemble one. Glenn urged the President not to reinstate military aid until the Administration has obtained "reliable assurances from the Pakistanis that they have ceased producing nuclear explosive materials."

At issue is the global spread of nuclear weapons and the integrity of the United States nuclear nonproliferation policy. In the case of Pakistan, the United States is in a difficult position because of its strategic interests in South Asia. Since 1985, Congress has required the President to certify every fall that Pakistan does not "possess" a nuclear weapon. It is doubtful that the Administration can do so again, if the law is subject to a strict interpretation (*Science*, 6 March, p. 1131).

The White House wants to avoid damaging its relations with Pakistan, something that could affect American efforts to support rebels in Afghanistan. Robert A. Peck, deputy assistant secretary for Near Eastern and South Asian affairs at the State Department, suggested on 5 March that Congress refrain from handing the Pakistani government an outright ultimatum on the issue. Peck, who appeared before the House Foreign Affairs subcommittee on Asian and Pacific affairs, also indicated that at this time the Administration probably could not provide the assurances that Glenn seeks.

The Administration's reluctance to confront Pakistan openly on the matter was also reflected in testimony delivered on 5 March by Richard N. Perle, assistant secretary of defense for international security. When asked by Senator William V. Roth, Jr. (R–DE), "When is a nuclear bomb a bomb?" Perle said it was "a difficult question." He suggested that a finding that a nation possesses a bomb should not be made just on the basis of the country's having a prototype bomb. Matters such as energy yield and delivery systems also must be considered, he added. Whether Congress will accept such an interpretation of the law remains to be seen.

Senator Glenn *wants assurances that Pakistan is not producing nuclear materials.*

Glenn has been a staunch supporter of U.S. policy on Afghanistan, but he is not about to sidestep the issue. A Pakistani bomb has the potential of starting a nuclear arms race with India, contends Glenn, who reminded Reagan that Pakistan already has a "made-in-America delivery system"—F-16 aircraft supplied by the United States. Says Glenn, "a failure to draw a line in Pakistan will be seen by other countries . . . as a tacit admission by the United States that . . . its nonproliferation policy is only a facade." ■

MARK CRAWFORD

NIH to Restore Slashed Grants

When the President submitted his fiscal year 1988 budget to Congress at the beginning of January, he asked for a retroactive cut of $334 million in funds for the National Institutes of Health for the current year by "extending their availability" FY 1988. NIH was instructed to behave as though the budget reduction were in effect. Consequently, grants issued since 5 January were pared by an average of 10% to 14% below study section recommendations.

Now, the Administration has backed down. Last week, NIH received clear orders to spend the full $6.2 billion that Congress has appropriated for this year. Researchers whose grants were cut substantially can expect an increase. However, the increases will not necessarily be uniform, nor will every grant awarded since January be amended. For instance, some smaller grants were not reduced significantly in the first place.

Internal NIH records for recent grants should show two figures: one recording the amount at which the grant would have been funded under business as usual, the other showing the additional "downward negotiation." In many cases, the restored funds will be the difference between those two figures, but institute officials will have considerable latitude. Some 1600 to 2000 grants are subject to revision and it is likely to be late April before the process is complete.

The Administration's retreat, forced by pressure from Congress and the threat of a lawsuit alleging illegal withholding of funds, was signalled by a letter from the OMB director to the secretary of Health and Human Services. Dated 24 February, it instructed the department to cease its withholding of funds. But it said nothing about withdrawing the President's proposal.

In a subsequent letter, this time from HHS Secretary Otis R. Bowen to Representative William H. Natcher (D–KY), chairman of the House committee for NIH appropriations, the Administration was more specific. In addition to amending recent grants, NIH will plan to support the 6354 projects contemplated in the appropriation for FY 1987, Bowen said. (The Administration had wanted a reduction of 700 grants.) Although the President's budget proposal has not been withdrawn, Bowen assured Natcher that NIH will be free to spend its full congressional appropriation for FY 1987 "unless the Congress enacts legislation to the contrary." Congress has made it plain it has no such intentions. ■

BARBARA J. CULLITON