Bloch Leaves NSF in Mainstream

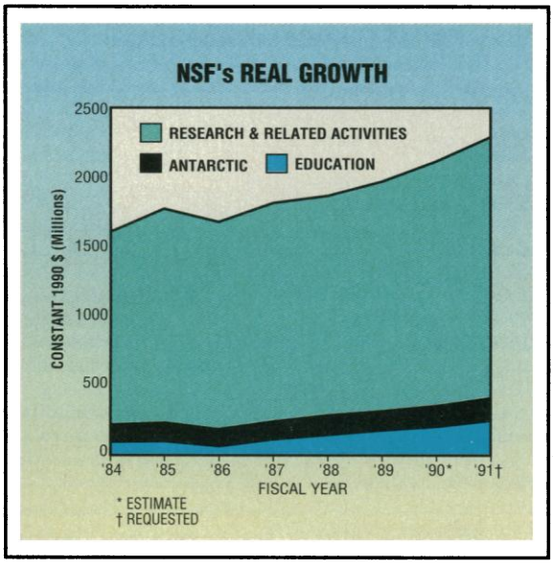
Departing National Science Foundation Director Erich Bloch propelled the agency out of the ivory tower and into the national political fray—but at what cost?

THE LATEST BOMBSHELL in the budget wars has shattered the usually quiet summer at the National Science Foundation. Richard Darman, director of the White House Office of Management and Budget, has ordered NSF—along with most federal agencies—to prepare contingency plans for a 32% budget cut. With Congress and the White House mired in negotiations on how to slash the deficit, and the Gramm-Rudman-Hollings fiscal buzzsaw poised to kick in on 15 October, Darman is trying a little shock therapy. When asked at a recent press conference how the foundation could respond to such a cut, director Erich Bloch's answer was simple: close up shop for 6 months.

In other years, scientists who rely on NSF for funds would be looking to Bloch for more than his characteristic bluntness. As one of their strongest advocates within the Bush Administration, Bloch would be expected to strike the best possible deal for science funding, and his track record shows he can do it. But, for good or ill, scientists will now have to rely on other champions: Erich Bloch will be leaving NSF at the end of this month when his 6-year term as director comes to an end.

Bloch will go down in the books as one of NSF's best directors—not because everyone agrees that he led the agency in the right direction, but because he led it vigorously. He introduced a new, aggressive management style, set pragmatic goals, increased the budget, and cut a wide swathe in Washington's policy circles.

But in spite of his accomplishments, Bloch upset a major portion of NSF's traditional constituency: individual investigators in pure science disciplines. Many have complained that Bloch focused too much on engineering, poured budget increases into interdisciplinary research centers while shortchanging small science, placed an undue financial burden on universities by insisting on matching funds for some NSF grants, and tacked NSF's colors too firmly to the mast of industrial competitiveness. Bloch, in his trademark style, calls these complaints "absolute nonsense."



In 6 years at the helm, Bloch showed himself to be an adept politician and a strong advocate for research. While other federal programs were being cut, Bloch argued for an increase in NSF's funding, and got it. Specifically, Bloch got two presidents to promise a doubling of NSF's budget over 5 years. Though such promises could hardly be fulfilled in a time of deficit reduction, Bloch did achieve a 26% increase after inflation from 1986 to 1990—not bad, even though it left many individual investigators feeling cheated. "He proved to be a very successful lobbyist for his budget," says Representative Robert Walker (R–PA), ranking Republican on the House science committee, "and that legacy will be there long after he retires."

"I'm as much in favor of the SSC as anyone else. But I would not [have] put it as a first priority."

—Erich Bloch

The reason Bloch was so persuasive, NSF staffers say, is that he is good at explaining how research serves the public interest and because he took decisive steps to bring the agency into the mainstream of national policy. By this they mean that he reshaped the agency to reach beyond the old NSF constituency—the top research universities. And he dusted off NSF's charter to prove that the foundation had an obligation to support science education, applied research, and human resource development every bit as much as basic research.

When Bloch arrived in 1984 he found, as one congressional aide says, "an ossifying NSF" with "cobwebs growing in the corners." The agency had become reactive, says Bloch—grant applications came in, money went out, and that was about it. Bloch shook things up. He quickly expanded the director's prerogatives, winning permission from the White House to name his own assistant directors without going through the presidential appointment rigmarole. He asked NSF division chiefs to justify their programs from the bottom up. This "scrubbing the base," as NSF's congressional liaison officer Joel Widder calls it, "forced people to tell [Bloch] what they wanted to do, what they would give up, and how they would do it." In a recent interview with *Science*, Bloch explained why he made this demand. "I have a high suspicion of organizations," he says. "When I came in I took 10% off the budget of everybody. That forced people to look at things in a different kind of way."

After the staff ranked NSF's programs by priority, Bloch used their lists to propose cutbacks. Some science programs, such as mathematics and computer science got healthy increases, others like astronomy and the social sciences either stayed level or declined. This early gesture, says Widder, "gave him very good credibility at OMB right off the bat."

What especially impressed Reagan Administration officials was that Bloch changed NSF's image from that of a mother hen for a brood of academic scientists to an agency with a plan for improving the nation. Alan Leshner, deputy director of the National Institute of Mental Health who was

formerly in the biology directorate at NSF, explains that Bloch "felt we needed to be leading the field—not just sitting back and accepting proposals, but figuring out where the big leverage points were and going after them."

Few issues garnered more interest in the Reagan years than concerns that the United States was losing its competitive edge. The Administration accepted the idea that high technology industry held the key to future prosperity, but aside from the Defense Department, no federal agency was geared up to support cutting-edge R&D likely to have industrial payoff. Bloch argued NSF could fill part of that role. He also argued that the foundation was ideally placed to ensure that the next generation of technically trained people would be in place.

To demonstrate his commitment to national concerns, Bloch expanded a nascent NSF thrust: the centers programs. NSF had launched the first engineering centers in 1983, and Bloch fostered the program when he became director a year later. He also established the Science and Technology Centers program to encourage multidisciplinary research that would reach out to industry. In addition, he built up the engineering and computer science budgets within the foundation: in 1984, those two areas accounted for a little under 12% of NSF total research budget—by 1990 the figure was at 21%.

The White House loved it, and NSF's budget grew. Some in the science community were also supportive. Says D. James Baker, president of the Joint Oceanographic Institutions, "Both Reagan and Bush have been supportive of science—that's damn good—but you could imagine a lot of people who could have taken that opportunity and screwed it up."

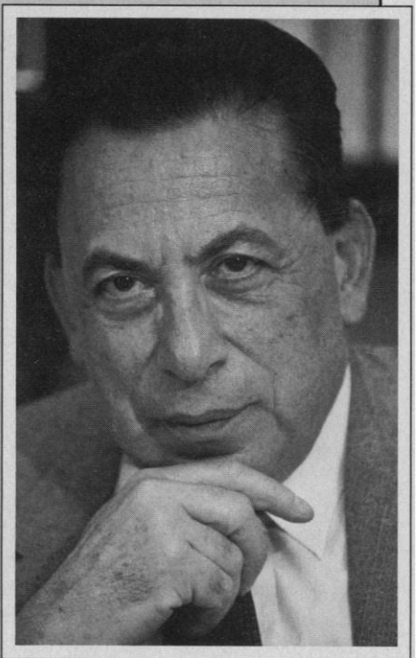
But top-down leadership rankles many scientists. Bloch's emphasis on programs with a strong applications component brought out vocal critics. Although not exactly a deal with the devil, skeptics thought this approach to supporting science risked (i) a backlash if the investment in NSF did not appear to pay off, or (ii) a long-term change in government support of science, linking it too tightly to industrial goals. Bloch clearly believes that basic research is important, but he tends to cast its importance in economic terms. "Strong and sustained public investment in basic research, in science and mathematics education, are two critical components of any successful strategy to promote economic growth," he says.

"I'm not sure he really understands in a visceral way what basic research is or does," says Leon Lederman, director emeritus of

Leadership with an Industrial Flavor

When Erich Bloch leaves his post as director of the National Science Foundation at the end of this month, he will have accomplished something no director has managed in 20 years—a complete, 6-year term. Bloch arrived in Washington at a time when there was a revolving door at the NSF director's office: Richard Atkinson lasted from 1977 until 1980 when he became chancellor of the University of California at San Diego; his successor John B. Slaughter stuck with the job through the first year of the Reagan Administration, then bailed out in favor of the top job at the University of Maryland; and then came physicist Edward A. Knapp who lasted less than 2 years before returning to Los Alamos National Laboratory.

President Reagan originally named Bloch as Knapp's deputy, but Reagan asked him to take over the agency when Knapp announced he was leaving in 1984. "I think Bloch was exactly the right appointment in the Reagan years," says William Carey, a former top official at the White House budget office and executive officer of the AAAS, who is now at the Carnegie Corporation. "What they got was a man with a solid industrial record, someone who did not talk in parables, and had his feet on the ground," says Carey.



Erich Bloch

Bloch's solid industrial record consisted of 22 years at IBM. In the early 1960s he headed the solid logic technology program which laid the foundations for the extremely successful System/360 computer, a job that won him a National Medal of Technology in 1985. He later directed IBM's East Fishkill facility which developed and manufactured semiconductor components for IBM products.

Bloch was born on 9 January 1925 in Sulzburg, Germany. He studied electrical engineering at the Federal Polytechnic Institute of Zurich, Switzerland, and completed his Bachelor of Science degree at the University of Buffalo in 1952, the same year he started at IBM. The fact that he does not have a doctorate confounds many in Congress and elsewhere who persist in addressing him as Dr. Bloch.

Bloch's no nonsense style proved a relief to congressmen tired of equivocating bureaucrats. Representative Bob Traxler (D–MI), chairman of the appropriations subcommittee responsible for NSF's budget, says he liked the way Bloch routinely brushed off compliments in order to get down to business. "At hearings we'd say something like 'Welcome Mr. Bloch, NSF is our favorite agency,' and he'd say, 'Then give us more money.' "

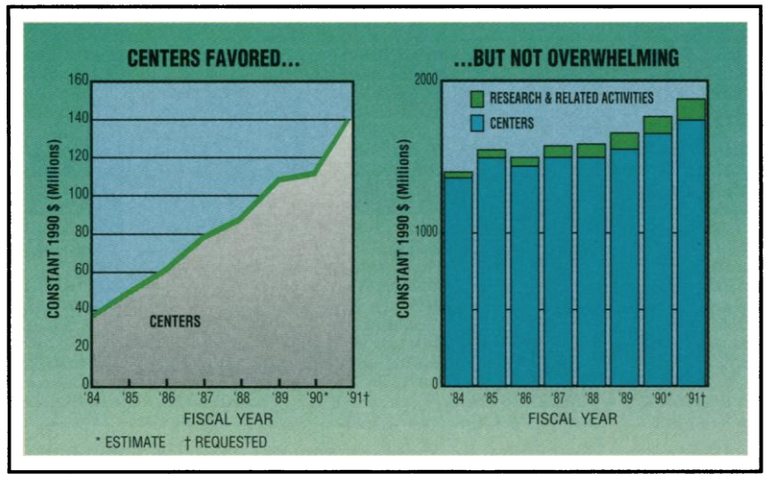
He often got more money, but not for every pet project of his staff. "He expected everybody to be extremely articulate and forceful in defense of what they did, to know it in great substance," says Alan Leshner, currently deputy director of the National Institute of Mental Health but formerly executive officer of the directorate for biological, behavioral, and social sciences. "He was a tough cookie," adds Leshner.

Robert White, president of the National Academy of Engineering, points out that Bloch's directness wasn't confined to internal discussions. "He will take anybody on, whether it is a critical reporter, people on the Hill . . . or someone in the Executive Branch," says White. "He doesn't mind if you disagree with him, and he will change his mind. But he wants you to know where he stands."

This tough mindedness made Bloch an effective administrator, but not lovable. "He is not a sweet guy," says one former associate who asked not to be named, "and he's not fun to be around." Until recently. Bloch's tone has softened, and he has become more expansive in interviews as he nears the end of his tenure. Says a former associate: "I have to say that recently he's been more fun than he used to be."

■ J.P. AND E.M.

Fermilab. "My evidence for this is that he kept saying that he was tired of funding 'the same old basic research'—that he wanted something new. That, to me, was the tipoff." Lederman, like many others, thinks that no matter how pragmatic the goals may be, the nation's funding of creative science must be supportive and not directive. Which is why scientists like Lederman remain deeply suspicious of the centers program. But their doubts haven't swayed Bloch.



Upswing. *Funding for centers still accounts for less than 10% of NSF's total.*

NSF presently supports 19 Engineering Research Centers to the tune of $48 million and 11 Science and Technology Research Centers costing approximately $27 million. These two programs are intended to encourage university-government-private sector collaborations, as well as providing a long-term funding base for interdisciplinary and high-risk projects. And each is eligible for a minimum of 5 and a maximum of 11 years of NSF support—a kind of sunset clause that Bloch uses to assure skeptical scientists the programs won't take on lives of their own like other big science projects.

But critics see flaws in every aspect of the program. Although some industries have warmed to the centers, plant geneticist Lawrence Bogorad of Harvard doesn't believe they will ever attract very much nonfederal money. Nor does he like their substance: "I'm not convinced that every subject needs multidisciplinary centers as a way to progress." Daniel Kleppner, a physicist at Massachusetts Institute of Technology, says increasing center funding while cutting back individual grants "sent a negative message: 'Do science our way.' . . . It caused a tremendous break in morale."

But Bloch points out that centers just aren't taking that big a bite out of the total research pie. Although the overall budget for centers activities has skyrocketed over the last 5 years, it still accounts for less than 10% of the total research budget. He adds that centers dollars are supporting individual scientists too—some 500 individual researchers by the latest count.

Indeed, some academics praise the initiative. Richard Cyert, retiring president of Carnegie Mellon University, where there are two engineering centers, says: "There is no question that the centers are proving their worth." Adds Rensselaer Polytechnic President Roland W. Schmitt, formerly chairman of the National Science Board: "Some of the most exciting and promising areas of research tend to be in interdisciplinary areas. That's an arena that's almost always underexploited in an academic environment unless there's some pressure put on them."

Changing the academic environment has been another of the foundation's controversial new directions. When the Reagan Administration first came to power, it zeroed out NSF's education funds, arguing that the federal government shouldn't be involved in such activities. But Congress balked. It provided modest funding to keep the program alive and NSF began to rebuild the effort in 1984, when University of Wisconsin chemist Bassam Shakhashiri was appointed head of the education directorate. Bloch, who arrived at NSF several months after Shakhashiri, defended budget increases to OMB.

Meanwhile, several blue-ribbon panels, including two from the National Science Board, surveyed U.S. education in the mid-1980s and judged it to be in sorry shape. NSF jumped into the education rehabilitation boom. With Congress's backing, Shakhashiri suggested in 1989 that education's share of the NSF budget—already growing faster than any other—should grow to $600 million by 1992, or 20% of the total. That led to resentment within the foundation from some program managers who see education's gain at NSF as a loss for research. Indeed, in an interview with *Science* earlier this year, Shakhashiri said, "I work in a hostile environment."

Just 2 months before leaving office, Bloch abolished Shakhashiri's post and chose a new man, Luther Williams, former president of Atlanta University, to take over the new human resources portfolio. Although it has been reported that Bloch was upset by Shakhashiri's empire building, Bloch denies it. He insists that the shakeup had nothing to do with budgets, but reflected his desire to bring in new talent and "ensure continuity" in the education programs after his departure (see p. 839).

Other initiatives during Bloch's tenure were less newsworthy, but nevertheless controversial. Bloch is proud, for example, that he was able to get more bang for the NSF buck by setting up partnerships between grantees and private organizations. In 1984, he says, $138-million worth of NSF programs were "leveraged" with just $56 million in private funds. Six years later, NSF has got $510-million worth of outside support for $538 million in a variety of programs, including centers, facility support programs, and human resource programs.

This is one of the "striking" changes Bloch made at NSF, says Paul Gray, outgoing president of MIT. But, Gray says, it's a policy "on which he and I disagree sharply." Gray argues that private universities like his own, which are already begging for all the donations they can get, simply cannot afford to match NSF grants on a 50–50 basis. He says some state schools may be able to do that with help from the legislature, but not many private ones can.

Gray is particularly upset that NSF last week awarded a $60-million grant to Florida State rather than to MIT to establish a national magnet laboratory. Florida won the prize in part because the state had agreed to contribute $58 million to the project (see p. 851). Gray is also furious that NSF predoctoral fellowships do not cover the full cost of tuition at MIT. He figures the university must cough up at least $12,000 a year to accept an NSF fellow, and the total cost to MIT is now "several millions of dollars" a year. Enough is enough, says Gray: the university has now put a ceiling on the number of fellows it will accept.

Things are getting tougher for the big research universities, no doubt about it, Bloch says. And, given the struggle to contain the deficit, "it will get worse before it gets better." Nevertheless, he argues, it is less important to satisfy the NSF's old clientele than to broaden the reach—to "bring in new people . . . fund new programs." As for the cries of distress from academia: "People have become comfortable. They think [federal support is] an entitlement. Well, there are no entitlements around. . . . We better realize that we are living in a different world."

The big task, Bloch says, is to persuade the public and Congress of the value of basic research. Schmitt says scientists who complain to NSF that it should be spending more on basic research are attacking the

wrong target. "If they beat on Congress half as much as they are beating on NSF, the result would be a lot better for all of us," he says. By a quirk of congressional appropriations rules NSF's budget falls in the same category as housing, the Veterans Administration, and the space program, so NSF is chronically fighting against some political sacred cows. And in some cases, Congress has been sold on a science project that really isn't one.

"There's no scientific justification for the space station, that's for sure," Bloch says. "But it's in the same committee with our budget, therefore I look at it as head-to-head competition." Bloch is also skeptical about the decision to proceed with other big-ticket science projects, like the Superconducting Super Collider and the Human Genome Project. "I'm as much in favor of the SSC as anyone else. But I would not [have] put it as a first priority in 1989, or 1988 when it was put in place. My high priority was doubling the foundation's budget first. Go focus on people first. Go focus on the infrastructure that has to be in place for an SSC to be effective," he says. He adds that the foundation is presently spending around 20% of its budget on facilities, and he would like to see that grow to 25%.

"There has to be a change in attitude which acknowledges that, by God, we cannot do everything, and therefore you have to set priorities." He believes that the amount the government spends on R&D—about $72 billion—is reasonable. But he argues that it should be allocated better, split evenly between civilian and military uses, and not lopsided in favor of defense as at present.

If priority setting was important 6 years ago, it is crucial now when the NSF—like all federal agencies—will face extreme pressures to curb spending. Bloch sees a hard struggle in the years ahead—harder even than the past 6 years, if the current gyrations over cutting the deficit are anything to go by. He seems glad to be stepping out of the fray, at least for now. When pressed for his parting words to the science community he had supported, confronted, cajoled, and challenged, he said with a smile, and an eye on the door, "Goodbye."

■ JOSEPH PALCA
ELIOT MARSHALL

Magnet Lab: Science to the Highest Bidder?

Last week, an old aphorism in big science grant awards—"them that has, gets"—got a new twist. "Them that has" usually means the big schools—the ones with lots of Nobelists and political muscle—while "them that hasn't" means almost any university located in the Midwest, South, or Southwest. But this time around, them that had were the administrators at Florida State University, who secured a 5-year, $58-million commitment from their state legislature that helped them snare a $60-million grant for the National High Magnetic Field Laboratory (NHMFL) from the National Science Foundation. And them that didn't have were officials at the Massachusetts Institute of Technology, who sought $81 million in NSF funds to locate the facility at MIT, but who could put up only $36.5 million themselves—and nothing at all from the state of Massachusetts.

On the face of it, NSF got a bargain: a $118-million facility for only $60 million, instead of a $117.5 million facility for $81 million. But did big money win out over scientific merit? MIT officials certainly think so. They were particularly upset because the decision overruled NSF's scientific advisory panel, which had recommended awarding the grant to MIT. And indeed, although NSF officials won't use those terms, David Sanchez, NSF's assistant director for mathematical and physical sciences, emphasized the importance of state support in the decision. "When you want to build a high-quality lab, you need the support of the institution and the state," he said. "We didn't see that [in Massachusetts]." MIT's proposed contributions to the project amounted to little more than renovation of its existing Francis Bitter National Magnet Laboratory, Sanchez said, whereas Florida State plans to construct new facilities and hire 30 new faculty members.

MIT president Paul E. Gray argues that this kind of logic plays into the hands of the public universities in boom states. Private institutions such as MIT cannot afford to match NSF grants, he says. Given an economic downturn in New England and persistent state deficits, "the thought that one might get money for such purposes from Massachusetts is ludicrous." Gray also says he can't justify putting much of MIT's capital into a "user facility" where only 20% of the users will be MIT scientists.

Have-not. *Paul Gray asks NSF to reconsider.*

But this sort of attitude may have led NSF officials to doubt MIT's commitment to the magnet laboratory. Even the scientific advisory committee that rated MIT's proposal technically superior said: "At MIT, it was difficult to sense any real enthusiasm on the part of the administration for the NHMFL on their campus. . . . MIT has stated quite clearly that it could not and would not do the job if the budget were cut in any significant way." Henry Kolm, a retired co-founder of the Bitter laboratory, said he was saddened by the NSF decision, but added that it was "not entirely undeserved. I did my work on magnet applications despite MIT, not because of it," he says.

The "commitment factor" appeared to outweigh MIT's scientific advantages. Researchers at MIT's upgraded Bitter lab probably could have produced a magnet with a 45-Tesla field strength—one of the NHMFL's goals—within 5 years. Florida State, on the other hand, "has no demonstrated capability in magnet technology and no individual who could serve as a leader in a state-of-the-art magnet development program," according to the advisory committee's report, a copy of which has been obtained by *Science*. The Florida State facility, which will include the University of Florida and Los Alamos National Laboratory as partners, "will undoubtedly require a minimum of 5 to 8 years to catch up even if it is successful."

MIT was quick to pick up this theme once NSF announced its decision. A few hours after the decision, its news office was faxing reporters a press release in which president Gray asked the NSF to "reconsider" its decision in the best interests of "America's international competitiveness."

Asked whether the NSF decision represented "science to the highest bidder," Florida State provost Gus Turnbull said it was "about time" for the southeastern United States to receive a high-quality science facility. "The people of Florida contribute a lot to the federal treasury," he pointed out. "The whole region has been shortchanged in terms of federal support."

■ DAVID P. HAMILTON