NSF Budget: House Group Reacts to Data on Plight of Science

Complaints that recent budget cuts are inflicting great damage on the American scientific establishment seem to have moved the House Science and Astronautics Committee last week to recommend that the National Science Foundation be allocated $27.6 million *more* for the next fiscal year than the Nixon Administration had requested. The committee approved a budget authorization of $527.6 million for NSF in fiscal 1971 instead of only $500 million as proposed in the President's budget. That authorization would finance all NSF activities except the national sea grant program which is covered by separate legislation. The action, though not unprecedented, was unusual. Congressional committees generally cut the President's budget request —they seldom recommend an increase.

The science committee's recommendation does not ensure that NSF will actually receive an unexpected bundle of money. Three other committees—the House Appropriations Committee, the Senate Labor and Public Welfare Committee, and the Senate Appropriations Committee—must still take action on the NSF budget, and the appropriations committees have generally been rather hard-nosed toward NSF. Last year, for example, NSF ended up getting about $60 million less than the highest figure recommended by one of the committees. Nevertheless, the science committee's action is a significant indication that some congressmen are now convinced that American science is indeed in trouble.

The committee's action was based on recommendations by its Subcommittee on Science, Research, and Development, headed by Rep. Emilio Q. Daddario (D–Conn.). The Daddario subcommittee, in the course of 7 days of hearings on the NSF budget, developed some of the "hardest" information yet available on the current plight of American science. The subcommittee concluded, for example, that various federal "mission agencies"—primarily the Defense Department, the National Aeronautics and Space Administration, the Atomic Energy Commission, and the National Institutes of Health—are terminating almost $60 million worth of research projects at the nation's universities either because of budgetary stringencies or because of a new attitude, fostered by the so-called Mansfield amendment, that basic research must be closely related to an agency's mission. The subcommittee also came up with figures indicating that the number of first-year graduate students receiving federal fellowships and traineeships will drop by a precipitous 50 percent between fiscal year 1970 and fiscal 1971.

Science on the Rack

On the more subjective and emotional side, the subcommittee heard testimony from academic scientists at first- and second-rank institutions who alleged that good students are being driven away from science and that good facilities are going to waste. "I think we understand the belt tightening, but generally a belt is pulled up rather gently rather than rapidly like a medieval rack," complained Thomas F. Jones, Jr., president of the University of South Carolina and a member of the National Science Board, the policy-making body for NSF.

One great problem in assessing the current budget situation is the dearth of hard, quantitative information. As Daddario complained in a recent speech: "No one really knows what is going on right now." Daddario said that various mission agencies have been reducing their support of academic science and basic research in recent years, and that this has increased the pressure upon NSF to provide support for the projects that are being cut off by other agencies. Daddario's subcommittee, in pondering the NSF budget request this year, decided to "quantify the problem," by asking the various agencies to indicate what academic science projects they are dropping during fiscal years 1970 and 1971 because of budget restrictions. "This sounds like a simple question to ask of any outfit that uses an up-to-date information system with nano-second switching times and giga-bit memories," Daddario said. "But what answer did we receive? Well, 1968 data was available and complete. 1969 data was beginning to be available, and some agencies were able to provide it. With regard to 1970 and '71 data we were asked to wait a couple of years."

Nevertheless, the subcommittee, with the help of NSF, pieced together some data that indicates the magnitude of the budgetary problem facing science in general and NSF in particular. The subcommittee came up with what it regards as a "conservative estimate" that mission agencies during fiscal 1970 and 1971 will drop $57.9 million worth of academic research projects which can probably be expected to appeal to NSF for support. The projects are those which had previously been funded by the mission agencies but which the agencies plan to drop or sharply reduce in fiscal 1971 because of budgetary problems. The subcommittee estimates that the Defense Department will drop $23.1 million worth, the National Aeronautics and Space Administration will drop $22 million, the Atomic Energy Commission $8.6 million, the National Institutes of Health $3.8 million, and the Office of Saline Water, $400,000.

Mystery at NIH

The subcommittee's estimates are based partly on data received from the agencies through official channels, and partly on information supplied by "reliable sources" familiar with the various agencies. In some cases the estimates are probably low. The NIH, for example, for reasons that are baffling to officials elsewhere in the government, apparently won't tell anyone what it is doing. Thus the $3.8 million estimate for research dropped by NIH is largely based on information about NIH projects that have already approached NSF for support. Subcommittee staff members believe the estimate is conservative and that additional NIH cuts may ultimately come to light.

Only a small part of the decline in mission agency support seems to have been caused directly by the Mansfield amendment, which prohibits the Defense Department from supporting any research that does not have "a direct or apparent relationship to a specific military function or operation." The subcommittee, using figures supplied by DOD, reports that the Mansfield amendment is forcing the military agen-

POINT OF VIEW

The Human Toll of Science

The UNESCO journal, Impact of Science on Society, *devoted its October–December issue to a discussion of science by nonscientists and, in an interview, Robert Graves, poet, novelist, and classicist, made this comment on one aspect of the scientist's life:*

Interviewer: Let's talk more about science and human purposes. Do you feel, Mr. Graves, that a price is being paid for the material improvements that science and its offspring, technology, have brought to the human condition?

Graves: One bad effect lies in the very heart of science itself: I'm talking about scientists—or more particularly, scientists' wives. I've known a number of leading scientists and their wives, and regret having observed, as a generalization, that science takes a horrible toll of wives. There's more mental ill-health among the wives of scientists at the higher levels than anywhere else—which proves that something's wrong.

Interviewer: What form does this mental ill-health take?

Graves: A sense of frustration . . . because the husbands live in a world into which their women are not invited and which they feel is a dangerous world. The men live in an exclusive world in which things are viewed in a strange and different way. They cannot communicate with their wives about their work in the way open to most husbands. The wives are excluded and, like all women isolated or barred from a large part of their husbands' lives, endure a cruel sort of loneliness. . . . In a metamorphical sense, you might say they [scientists] are shooting at the moon and evading the human ties of earth.

cies to drop about $8.2 million in basic research at the universities during fiscal year 1971. All the remainder of the $57.9 million in research being dropped consists of projects that are being cut for budgetary reasons or because various agencies have adopted the "philosophy" of the Mansfield amendment even though they are not directly affected by it, subcommittee staff members say.

The subcommittee has also collected estimates which reveal a sharp decline in the number of new traineeships and fellowships awarded to graduate science students by nine major federal agencies. In fiscal year 1969 there were 6515 new awards; in fiscal year 1970 there were 6012; and for fiscal year 1971, the Nixon budget would support only 3069, a drop of almost 50 percent in just one year. The totals do not include Public Health Service training grants, for which no firm figures are available.

Within those total figures, the number of new fellows and trainees supported by NSF will drop by almost two-thirds, from 2772 in fiscal 1970 to 1000 in fiscal 1971; the number supported by the Office of Education will drop by one-half, from 1653 to 825; and the number supported by the National Institutes of Mental Health will drop by two-thirds, from 416 to 133. NASA, which supported 420 individuals in fiscal 1969, will not support a single one in 1971; and the AEC, which supported 233 in fiscal 1969, will support only 160 in 1971. No up-to-date figures are available for NIH, which had already experienced a steep drop from 650 in fiscal 1969 to 100 in fiscal 1970.

Academic Woes

In an effort to further document the damage being done, the subcommittee held a special day of hearings to take testimony from four academic leaders. The testimony, not surprisingly, was anguished and full of dire predictions about the decline of American scientific eminence.

One theme that dominated the testimony was that budgetary stringencies and other factors are causing some of the very ablest students to abandon or shy away from science. Benjamin Lax, director of the National Magnet Lab at MIT, reported that "one of the most brilliant" graduate students at MIT recently came into his office seeking advice because the student now "wants to leave physics and possibly go into humanities." Lax said the student was responding not only to the financial squeeze but also to the general "disenchantment" with science and the general "misconceptions" about the lack of relevance of scientific studies. "Even talented people like this do not feel in 4 years when they graduate they will have jobs or opportunity to make a significant contribution," Lax said. "It takes 4 or 5 years to get a degree . . . And now what is going to happen is youngsters like this one will change or will not go into the sciences. Five years from now we are going to have a shortage."

Ivan L. Bennett, Jr., director of the New York University Medical Center, told of similar feelings among students at the medical school he heads. Bennett said that NYU had pioneered a program that enables students to receive a combined M.D. and Ph.D. degree, and that the success of this program was reflected in the fact that NYU, over the past decade, has graduated the largest number of students who go on to become full-time faculty members in other medical schools. The program thus enables students to pursue careers in scientific research instead of medical practice. But Bennett said that about 6 months ago the present group of M.D.–Ph.D. candidates asked to meet with him for discussions. "There were several of these very gifted young men who were seriously considering dropping the Ph.D. part of the program," Bennett said. "The reason was not that they felt they could contribute to society by practicing medicine . . . It was simply because they looked about and saw the young members of our faculty finding increasing difficulty in obtaining support for their own scientific work, and wondered whether they were not preparing for careers that really would be obsolete by the time they were prepared to do this. It is a very serious problem."

A second theme of the testimony was that financial stringencies have largely crippled certain laboratories, including some with outstanding reputations and others of lesser rank. Lax asserted that the National Magnet Lab which he heads at MIT is currently being used at only one-eighth of its potential capability. He said the laboratory was forced to cut its operating time in half

because of budget cuts this past year. He also said the laboratory has virtually eliminated its program for visiting scientists (there were 100 visitors in 1969), and has dropped most of its postdoctoral programs. To make matters worse, the Air Force, because of the Mansfield amendment, has decided to terminate its support of the laboratory and has asked NSF to pick up the tab. Lax claimed the U.S. is in danger of losing its leadership in magnetic studies. "Our success at our laboratory has spurred the French, the Dutch, and the Germans to duplicate our facility," he said. "The Russians are proposing an even larger one. The Dutch have requested us to build a magnet which takes advantage of our latest developments. If we do this, this will put them abreast of us or possibly ahead of us. If the National Science Foundation does not take on the responsibility and support of our version of this advanced project, we will definitely relinquish our leadership within 2 or 3 years."

Lax also said the Haystack facility at MIT, which he described as "one of the best radio astronomy tools in the United States and in the world," will be "irretrievably lost" unless new sources of financial support are found to replace support which is being withdrawn by the Air Force. And he said that an interdisciplinary space science center, which involves 16 departments at MIT, has had its budget cut in half over the past few years. The center's general research program, which totaled about $1 million a few years ago, will be completely dropped in 1972, leaving only some hardware projects.

Lesser Institutions Hurt

If the situation, as painted by Lax, seemed dire at a prestigious institution like MIT, it seemed close to catastrophic at an institution of the second rank, such as the University of South Carolina. Thomas Jones, president of the latter university, warned that the budget squeeze will be "especially hurtful to those states most in need of development." When federal agencies terminate their support, Jones said, "a ripple, then a wave, goes down through the pecking order of institutions as they scramble to find new sources of support. The lesser institutions experience an acceleration and disappearance of funds and . . . return to the second-hand spectator-type science that characterized those institutions prior to World War II." Jones said the amount of science support at his own institution in fiscal 1970 would probably be about half that of fiscal 1969.

Although some leaders of the scientific establishment have suggested that, in a time of financial crisis, the top-ranking institutions should be favored and the lesser institutions allowed to wither, Jones took a contrary view. "One might conclude these less than superb institutions are not really important to science in our nation," he said. "But let me say, nothing could be further from the truth. The future economic health of our nation depends on at least one institution that is excellent in science in every state in our nation." Jones said an institution within a state has a more profound influence on the local school systems, local industry, and the setting of goals for its young citizens than does a prestigious out-of-state school.

Influx of Foreigners?

One ironic result of the budget stringencies, according to some witnesses, is that foreigners are now often in a better position to make use of American facilities than our own citizens are. Charles L. Hosler, dean of the College of Earth and Mineral Sciences at Pennsylvania State University, testified: "In my own college I find it interesting that the number of postdoctoral fellows we can support from within the United States has diminished and yet we have had a great influx of people from Europe and behind the Iron Curtain." He said the foreigners have come from such countries as Poland, Czechoslovakia, Yugoslavia, Japan, Germany, Korea, China, India, Ghana, Liberia, and Nigeria. "Many of these we don't have to provide any support for at all," he said. "They would be willing to come if we give them the physical facilities and the ability to associate with the personnel we have on board." Hosler also said Penn State has "two departments in which we don't have any American graduate students—we have only foreign graduate students."

The academic witnesses appearing before the Daddario subcommittee seemed especially upset at the way in which budget cuts have been made. Jones, the University of South Carolina president, complained that the government's budget-cutting exercise has been "almost impulsive" and has reflected "a considerable degree of arbitrariness." He added: "We are sufficiently near to virtually a catastrophe which will be felt for two decades that we need here and now to make some orderly plan for a transition of funds from mission agencies to an agency or agencies that would look after the health of science, and in particular where there have to be cuts, they should be programmed in such a way that they don't hit all at once, so that your society or people or institutions can program the adjustments."

Similar rhetoric had been heard before, but the significant thing was that the Daddario subcommittee obviously bought it. The subcommittee recommended five specific increases in the NSF budget, and it particularly emphasized the need to support the education of young scientists and the need to continue projects that are being dropped by the mission agencies.

Specifically, the subcommittee recommended that:

►Funds for graduate traineeships, which are awarded to over 200 universities which in turn select the recipients, be increased by $9.5 million. The Nixon Administration planned to eliminate all new NSF traineeships in fiscal 1971, but the committee recommendation would restore the program to the level of the current year.

►$10 million be added to support academic science projects being terminated by the mission agencies. The Budget Bureau had earlier allocated $10 million to NSF to support such projects, so the committee's recommendation would give NSF $20 million, or enough to support about one-third of the estimated $60 million in projects that are being terminated.

►$4 million be added to the College Science Improvement Program, which seeks to upgrade science instruction at the undergraduate level.

►$4 million be added to support environmental research in the federal laboratories.

►$130,000 be added to assist state and local governments to plan for better utilization of science and technology.

Despite the committee's recommendations, it seems unlikely, in a year when there is such emphasis on the need to curb expenditures in order to fight inflation, that NSF will actually end up being allowed to spend more than the President requested. But leaders of the scientific community can take some consolation that their cries are being heard, and heeded, in at least some segments of the Congress.

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