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NEWS AND COMMENT

Budget Trauma: NSF Funds Run Dry at University of Massachusetts

Amherst, Massachusetts. Rudolf M. Schuster, professor of botany at the University of Massachusetts, felt highly honored when he was chosen to contribute to the distinguished international botanic compendium, *Die Natürlichen Pflanzenfamilien*, which he describes as "the *Encyclopedia Britannica* of the plant world." Schuster was to prepare two thick volumes on his research specialty, the small, mosslike plants known as Hepaticae. The work was to culminate some 6 years of research already completed with support from the National Science Foundation. All Schuster needed to go ahead was another NSF grant to finance further research and actual writing. He got it, along with some "frosting" in the form of a second NSF grant allowing him to visit Antarctica on work that would have contributed to the project.

But getting the grants and spending the money have proved to be entirely different matters in this melancholy budget year. Schuster got caught in a budget squeeze. The NSF told his university to curb its spending, and the university told Schuster he can't spend a single penny from his new NSF grants. This freeze, coupled with other budget stringencies in recent months, has cost Schuster the services of a postdoctoral assistant, a full-time artist, and a typist. "I'm out of business," he says. "Even if I wanted to, I couldn't complete the volumes alone. And if I don't meet the contract, the publishers will get someone else to do it. Six years of work will be down the drain."

Schuster's plight is apparently not unique, for budget cuts imposed on scientific research this year seem to have inflicted great personal and professional pain on many investigators throughout the nation. Here, at the University of Massachusetts, the wreckage seems especially visible, for Massachusetts belongs to a class of perhaps 20 or more rapidly expanding institutions that has been particularly hard hit by this year's budget stringencies.

The prime mover in bringing about the cuts was Congress, which required President Johnson to reduce his projected expenditures for fiscal year 1969, the current year, by some $6 billion. The impact on research spending was uneven. Agencies with huge, multifaceted budgets, such as the Defense Department or the Atomic Energy Commission, were able to protect their basic research budgets by making cuts in other programs. Agencies whose primary business is research, such as NSF and the National Institutes of Health, had to take a big bite out of the research community.

The chief problems here have been caused by NSF cutbacks. There are scattered complaints about restrictions imposed by other agencies, notably NIH and the National Aeronautics and Space Administration, but in most cases the investigators say they can "live with" the cutbacks. With respect to NSF cutbacks, however, Arthur C. Gentile, coordinator of research and acting graduate dean, insists that the situation at Massachusetts is "very critical"—so critical, he says, that "research conducted with Foundation funds will essentially come to a standstill." That's saying a lot in a university where 30 percent of the $7.2 million in research money awarded to the university last year came from NSF.

The budget crisis at Massachusetts stems primarily from the fact that NSF's method of imposing expenditure reductions did not take into consideration the peculiar needs of rapidly expanding institutions. After the Budget Bureau gave NSF a spending ceiling for fiscal 1969, NSF in turn assigned spending ceilings to some 500 institutions and left it up to these institutions to decide what NSF-sponsored projects on campus should be canceled or cut back so that the institution as a whole would not exceed its ceiling. Unfortunately for Massachusetts, the base from which NSF computed these institutional ceilings was the amount of NSF money spent by the institutions in fiscal 1968.

Foundation officials explained that they worked from fiscal 1968 figures because these were the only firm figures available. But university administrators here feel the formula was "unfair." They say it fell more harshly on institutions that were greatly increasing their NSF expenditures than it did on more stable institutions. The expenditure ceiling imposed on Massachusetts, for example, was $996,000. This represented a cut of about 23 percent from the previous year's spending total of almost $1.3 million, which was bad enough. But when considered as a reduction from roughly $2 million in NSF expenditures that would normally have been made in fiscal 1969, the cut amounted to a whopping 50 percent. (The $2-million estimate includes expenditures from grants already awarded by NSF, from grants that were expected to be renewed by NSF, and from new grants expected to be awarded by NSF. All figures have been supplied by the

university. NSF declines to discuss specific cases.)

The cut is so steep, according to university administrators, that there is not even enough NSF money available to honor all the salary commitments which have been made to graduate students and postdoctorates. The university estimates that as of 1 September it had already spent or encumbered all but $318,161 of its NSF ceiling. Yet the university claims it has already made salary commitments to postdocs and graduate students totaling $513,494. Investigators insist that all these commitments are "firm," and while there may be a certain amount of fudging going on, the university says that almost all these commitments are in writing.

Drastic Action

Since Massachusetts regards itself as already in the hole, university officials have been forced to take drastic action to curb spending. The university has stopped all personnel appointments on NSF grants; frozen all purchasing by NSF grantees; warned 131 graduate students that it will not be able to meet payroll commitments to them unless more NSF funds are obtained; and issued orders that no travel charges can be made against NSF grants, that no summer salaries can be charged to NSF for June 1969 (faculty members at Massachusetts receive no salary support from NSF during the normal academic year), and that all NSF grants scheduled to start in fiscal 1969 must be deferred.

A high-level committee of administrators and department heads was set up to establish a policy for making expenditures within the NSF ceiling, but the committee has had little to do. It decided that commitments to research personnel must be honored, and since there is not even enough money to do this, there was no need to figure out how to allocate budget cuts among the various grantees. As it stands now, no NSF grantee is supposed to spend a single penny for anything except the salaries of his assistants without getting special permission from the high-level committee. Thus far the committee has allowed one exception—the physics department was allowed to spend almost $4000 to host a major conference.

But surely, one asks, there must be some money available to take up the slack? Provost Oswald Tippo says there is not—at least not enough to do much good. He says the university is operating on a "hold-the-line" budget this year and has "absolutely no loose money." The university has never built up a reserve fund for emergency use, he notes, partly because rapid expansion always seems to soak up every penny, and partly because the legislature would probably use the existence of such a fund as an excuse to cut appropriations. In some instances, the university has been able to divert funds to ease the NSF pinch—but always at the expense of other programs. Some departments are dipping into money intended for office supplies, lecture demonstration gear, shop tools, and such research supplies as chemicals and wire. Some NSF grantees are even snitching supplies from investigators supported by other agencies. "We'll get along for awhile, but someday it will all catch up with us," says one department head. The most optimistic university administrators predict that they will find, somewhere, enough money to meet the commitments to graduate students and postdocs. But, unless there is additional money forthcoming from the federal or state governments, no one believes there will be much money to buy equipment and supplies for NSF grantees, or to pay the salaries of technicians, undergraduate assistants, or clerical personnel supported by NSF funds.

Disruption of Work

The spending freeze is having a serious impact on the ability of some investigators to carry out their work. University officials say, in general, that the freeze has fallen hardest on experimentalists, who require expensive equipment to conduct their research; on younger faculty members, who generally don't have a backlog of data that can be profitably worked over during periods of no funding; on graduate students, who may find their educations disrupted if money can't be found to support them; and on recipients of new grants, who can't spend a thing to get their projects started. The main impact of the freeze will be to delay the completion of research work, but in some cases a delay will effectively kill off a project entirely.

Tales of hardship abound on this campus, and while it's always hard to tell whether an investigator is "crying wolf" or is really in deep trouble, the following examples suggest that the cuts have indeed inflicted grievous damage on some NSF-supported researchers:

► Marcel Vanpee, professor of chemical engineering, who is called a "world authority on combustion" by his colleagues here, arrived on campus last January, won an NSF grant, and started purchasing custom-built equipment essential to his research. He still needed several thousand dollars worth of equipment when the freeze came. If the money can't be found somewhere, Vanpee's project will be dead, at least temporarily, and two graduate assistants will have to find something else to do.

► George Levinger, associate professor of psychology, has been conducting a 2-year study of roommate relationships. He has reached about the halfway point in his data collection, and suddenly finds that he has no money to pay students to serve as subjects or to pay his computer programmer. He may also have to drop his postdoctoral research associate, his graduate student, and his part-time secretary at mid-year. "The project is worthless unless it runs for two consecutive years," he says.

► Vernon Ahmadjian, professor of botany, had an NSF grant at Clark University in Worcester for 7 years, then switched to Massachusetts this year and got a new 2-year NSF grant to continue his research on lichens. Unfortunately, he had to leave his equipment at Clark, and he now finds he can't spend a penny from his new grant for equipment. The botany department has supplied him with about $6000 worth of equipment, but he still needs about $4000 more if he is to perform the work he proposed. If the money can't be found Ahmadjian says he will work over his backlog of data and will pursue research interests that don't require much equipment, but he calls this "a subversion of the grant."

► Fraser Price, professor of polymer science and enginering, is developing a course in microscopy as applied to polymers. He needs four polarizing microscopes to use in developing the course and in actually presenting it next semester. "We probably won't give the course if we can't find any equipment money," he says.

► H. Mark Goldenberg, associate professor of physics, who worked with Robert H. Dicke of Princeton on experiments that established solar oblateness, came to Massachusetts last year and soon received a 1-year grant from NSF plus additional university funds to build a sophisticated optical-electronic telescope to continue his research. Then the freeze hit, and it now appears that while Goldenberg will be able to complete his optical telescope this year, he will not have enough money to provide electronic instrumen-

NEWS IN BRIEF

• **FIRST POLLUTION SUIT**: The U.S. government has won its first suit to abate interstate air pollution under provisions of the Federal Clean Air Act of 1963. The Justice Department charged a Bishop, Md., animal rendering plant with discharging pollutants into the air across the Delaware state line. The judgment provides the Delaware state pollution director with the authority to declare that pollutants are crossing into his state. When this occurs, the Justice Department may issue a court order to close the processing plant immediately.

• **STANFORD RESEARCH INSTITUTE**: Student claims that Stanford Research Institute (SRI) is involved in chemical and biological warfare research and other defense projects have caused Stanford University to reexamine its ties with SRI. A 12-man student-faculty committee to study relations between the university and the neighboring institute has been established by acting president Robert Glaser and will report to the university by 1 April. SRI, a university-owned indedendent subsidiary, which adjoins the Stanford campus, operates on an independent budget of about $65 million. Both the university and SRI have common members on their governing boards, and some Stanford faculty have working arrangements with SRI.

• **LARGER DRAFT CALL**: As expected (*Science*, 8 Nov.), the Defense Department issued a larger draft call for January—26,800 men—the highest call since May and more than twice as high as this month's call. Monthly calls may average about 25,000 men in the first 6 months of 1969. It is anticipated by many educators that these higher calls will greatly increase the number of inductions of graduate students and thus affect graduate school programs.

• **REORGANIZATION**: The Department of the Interior has consolidated its water research programs, including its Office of Water Research. Assistant Secretary Max N. Edwards will evaluate proposed programs, establish priorities, and coordinate Interior's $83-million-per-year water resources research effort. Similarly, Interior will bring its marine resources programs under a single authority and establish an Office of Marine Resources (OMR) under Assistant Secretary Clarence Pautzke. OMR is expected to coordinate marine pollution control, estuarine studies, multi-use of the coastal zone and high seas, and other programs.

• **NSF ANTIRIOT PROVISION**: More than 18,000 graduate and undergraduate students now receiving National Science Foundation (NSF) support could be affected by an antiriot amendment, attached by Congress to the NSF appropriations bill. Like the recently passed Higher Education Act antiriot provision (*Science*, 27 September), the NSF version requires the university to give the student the opportunity for a hearing if the institution decides to withhold federal aid, but it differs from the earlier provision in that it does not require the university to cut funds for a student convicted of a felony as a result of a campus demonstration. The amendment affects about 500 NSF undergraduate basic research project grantees, 3700 undergraduate research participants, 2300 graduate fellows, 5600 graduate trainees, 1000 graduate summer trainees, and 5100 basic research project graduate assistants.

• **CHICAGO EXODUS**: The American Historical Association has moved its 28–30 December convention from Chicago to New York in response to adverse reaction among its members to the disorders in Chicago during the Democratic convention in August. At least three other national social science associations (*Science*, 13 September) have taken such action since the convention.

• **NEW PUBLICATIONS**: A study of careers of 10,000 doctoral degree holders indicates that, in general, academic salaries are less than 80 percent of nonacademic salaries. The study shows that salaries and the desire to teach are the most important considerations in determining whether individuals remain in academic positions. *Careers of Ph.D.'s: Academic versus Nonacademic*, a report of the National Research Council of the National Academy of Sciences, may be obtained for $6 from the Printing and Publishing Office, National Research Council, 2101 Constitution Avenue, NW, Washington, D.C. 20418.

tation, and he will thus be delayed a year in conducting meaningful experiments.

To be sure, not all investigators are badly hurt, and there is a good deal of exaggeration and self-pity in the weeping and wailing of some scientists. One senior faculty member, with a perfectly straight face, described his "personal tragedy" to *Science*. It seems he had originally hoped, using his own funds in addition to federal grant money, to spend 6 months in Japan, take his family with him, and then proceed to travel around the world. But because of various difficulties arising from the budget stringencies, his departure will be delayed, he now thinks he will spend only 2 months in Japan, he'll have to leave his son home, and he probably won't go around the world. "I'll still go to Japan," he pledges grimly, "but at greater sacrifice to myself."

Some campus cynics think many investigators are more concerned about the possibility of losing their summer NSF salaries than they are about possible disruptions in their research work. Federal grantees can receive summer salaries equivalent to two-ninths of their regular academic salaries, and university officials say many investigators have come to regard such salary supplements as "almost a Constitutional right." Department heads say some financially strapped investigators could not afford to do research in the summer without the additional salary. But others could, if they chose, continue their research and live comfortably on their regular university paychecks, which continue to arrive every week. "There's a lot of hypocrisy in all this," says one faculty member. "These guys may say they're concerned about their work or their graduate students, but they're really worried about losing that summer gravy."

The budget squeeze at Massachusetts has had a number of adverse effects besides the disruption of research projects already cited. Administrators say the cutbacks have had a "divisive" impact as faculty members squabble over who will get the few loose pennies on campus. There is also a morale problem as young investigators and graduate students, who are trying to make their marks in a competitive academic world, suddenly find, through no fault of their own, that they can't continue their research. Moreover, many young investigators are being pushed into inexpensive theoretical work, a trend which some department heads find alarming.

Several department heads report that investigators are increasingly reluctant to submit proposals to NSF, and that some faculty members are resorting to a "shotgun" approach, applying to several different granting agencies simultaneously in hope that one will come through with support. Department heads also predict that the number of graduate students accepted next year will have to be reduced sharply, and they say they are having difficulty recruiting topnotch faculty members from other institutions, for such investigators are generally able to spend at least part of their NSF money where they are, but if they came to Massachusetts, the outlook would be uncertain.

Such widespread woe practically demands that a "villain" be found, and at Massachusetts the culprit is generally identified as NSF. The Foundation is criticized for (i) making the universities responsible for allocating cutbacks among grantees, in contrast to other agencies which negotiated cutbacks on a grant-by-grant basis; (ii) failing to warn universities of the ceilings in time for them to take effective action to curb spending; and (iii) failing to consider the "growth factor" in setting expenditure ceilings. On all but the last count, the criticism seems unfair.

Aaron Rosenthal, NSF comptroller, says other agencies were able to use the grant-by-grant approach because their money is awarded to grantees on a yearly basis and these agencies could thus cut their fiscal 1969 expenditures by simply negotiating a reduction when an investigator came due for his fiscal 1969 money. In contrast, NSF puts out money on a multi-year basis and could only curb its fiscal 1969 expenditures by reneging on money that had been allocated in previous years. Since the universities were in a better position to know what NSF money had already been spent or committed from previous grants, and since it was important to take swift action to curb spending, NSF dumped the problem on the universities. This procedure also had the advantage of letting the universities apportion cuts so as to protect their departments from irreparable damage.

As for the charge that NSF was slow in getting the word out, the evidence indicates that NSF acted reasonably quickly. The legislation which required the budget cuts cleared Congress on 21 June. On 26 June, 2 days before the President signed the legislation into law, NSF sent out a notice to university presidents warning them to "start planning for operating within an expenditure limitation." Subsequently, the Budget Bureau, after a series of negotiations with all federal agencies, set an expenditure ceiling for NSF. Even before this figure was completely firm, Rosenthal says, the Foundation, on 14 August, sent out ceilings to the various institutions.

Could the Budget Bureau and NSF have acted faster? An outsider can't tell, but it seems clear that NSF couldn't possibly have acted quickly enough to help Masachusetts much. Administrators at the university say most of their commitments to students and faculty were made in the first 3 or 4 months of the year, generally before the budget-cut legislation was even introduced, and long before it was clear that the legislation would pass.

Nevertheless, earlier warning would have been of some value for the university would then have been able to curb spending by NSF grantees during the summer, including, perhaps, summer salaries. But if blame is to be apportioned, the university's own administration deserves some criticism for a sluggish response. University officials acknowledge that they did "essentially nothing" between the time they got NSF's 26 June warning and the time they received NSF's 14 August spending ceiling, at which point they went into a panic and froze all spending. The Massachusetts administration seems to have been about average in its response to the situation. According to Rosenthal, some universities took action as soon as they got the first notice, while others, as late as October, had still not got around to braking NSF expenditures.

Massachusetts is taking two major steps to relieve its budget crisis. The university plans to seek a deficiency appropriation from the state legislature, and it has appealed to NSF for an increase of $577,000 in its expenditure ceiling. Rosenthal acknowledges that NSF, in setting the institutional ceilings, "should have taken into account" the rapid-growth factor, and he hopes the Foundation will be able to "make some allowance for this." But almost 200 institutions have appealed to NSF for relief, and NSF has a relatively small reserve fund available.

Meanwhile, some investigators at Massachusetts are contemplating alternatives to government-supported research. Says Schuster, the botanist whose compendium project may be down the drain: "I bought myself a chain saw and said 'The hell with it.' I've got some land and I'll just go cut some trees."—PHILIP M. BOFFEY

Election: Morse an Apparent Casualty

The power structure of congressional committees with authority over science and education was virtually untouched by the election with the notable exception of the defeat of Senator Wayne Morse (D–Ore.). Morse lost by a minute margin of reported votes to attorney Robert Packwood and may ask for a recount.

Morse was in line to move into the chairmanship of the Senate Labor and Public Welfare Committee which has chief responsibility in the Senate for authorizing legislation for education and biomedical research.

Morse would have succeeded Senator Lister Hill (D–Ala.) who is retiring from the Senate this year. Hill, who devoted much of his attention to the fortunes of the National Institutes of Health in its period of great growth, in effect, delegated authority over education matters to Morse. As chairman of the education subcommittee, Morse has been a strong advocate of federal-aid-to-education legislation and has had a major hand in the enactment of a record number of education programs in recent years.

Heir apparent to the chairmanship now is Senator Ralph Yarborough (D–Texas) who ranked after Morse in seniority. Yarborough is expected to assume the chairmanship, but he is also eligible for the chairmanship of the Post Office and Civil Service Committee and must decide between the two posts. Yarborough is a leading figure in the liberal wing of the Texas Democratic Party and, like Morse, could be expected to take a "liberal" position on legislative proposals for education and biomedical research.—J.W.