

Institutional Programs

Foundation programs for improving and sustaining science in institutions of higher education began to undergo substantial reorientation in fiscal year 1970. A major change in the basis for computing Institutional Grants for Science greatly increased the number of institutions eligible to receive these flexible funds. Two separate programs designed to develop science in doctoral-level universities were replaced by a single Science Development program. And the oldest of the Foundation's institutional programs—Graduate Science Facilities—was discontinued as a discrete grant-making activity and became contributory to the new emphases planned for institutional development. Most of the changes in organization and function came late in the year, however, and their results will provide the content of future annual reports.

NSF obligations under the institutional programs discussed below appear in table 8.

SCIENCE DEVELOPMENT

For several years the Foundation has been making a large and sustained effort to increase the number of universities capable of conducting distinguished programs of education and research in the sciences.

The widely known University Science Development (USD) activity, initiated in March 1964, aimed to help very good universities to become excellent. USD has normally provided funds to improve several science departments in an institution. A related program, Departmental Science Development (DSD), begun in fiscal year 1967, has focused on a single department or area of science within a university. In both programs the Foundation's intention has been to assist universities in the achievement of their long-range science goals, and the grants have been predicated on substantial commitments of the institutions' own resources to the execution of their development plans. The 3-year grants under the DSD program have not been renewable for the same department, but the USD program has usually offered the prospect of 2 years of supplementary support if the initial grant resulted in the anticipated progress.

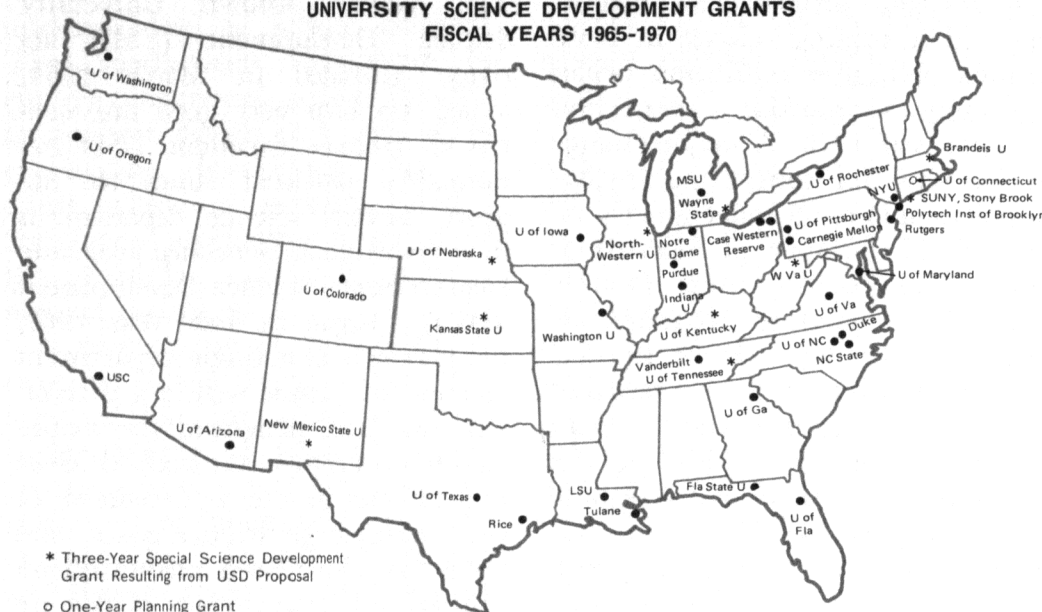
In fiscal year 1970 the Foundation obligated \$15.9 million through the University Science Development program. Supplementary awards to the University of Colorado, the University of Georgia, Louisiana State University at Baton Rouge, the University of Oregon, and the University of Rochester accounted for \$10.3 million; 3-year grants to Brandeis University, Northwestern

Table 8
Obligations for Fiscal Years 1968, 1969, and 1970

(Millions of dollars)

Program	Fiscal year 1968		Fiscal year 1969		Fiscal year 1970	
	Number of awards	Amount	Number of awards	Amount	Number of awards	Amount
Science Development:						
University Science Development.....	9	\$29.6	9	\$23.1	9	\$15.9
Departmental Science Development.....	29	12.0	15	8.6	18	10.6
Graduate Science Facilities.....	50	17.8	14	6.0	15	4.0
Institutional Grants for Science.....	497	14.2	(1)	(1)	634	14.5
Total.....	585	73.6	38	37.7	676	45.0

¹ A change in the timing of awards from June 1969 to fall 1969 resulted in no obligations in fiscal year 1969.

UNIVERSITY SCIENCE DEVELOPMENT GRANTS
FISCAL YEARS 1965-1970

University, and the State University of New York at Stony Brook, and a 1-year grant for curriculum development and planning to the University of Connecticut, accounted for the remainder of the obligations. The Foundation has awarded \$168.7 million through the USD program since its beginning. Thirty-one institutions have received large, multidisciplinary awards, and of this group 11 have thus far qualified for supplementary grants. Counting the supplements, the average NSF development support for the 31 institutions already amounts to \$5 million. Eleven other institutions have received special awards based on parts of their science development proposals. These special grants are somewhat less comprehensive and are smaller in amount, although one amounted to \$2 million and three others to more than \$1 million.

Through the Departmental Science Development program the Foundation obligated \$10.6 million in 18 awards in fiscal year 1970. Since the program began in fiscal year 1967, 59 grants amounting to \$33.1 million have been made to 54 institutions in 32 States. (Five universities have received two awards.)

The grants have averaged \$560,000.

In both programs public universities have received more funds than private institutions—62 percent of the total in the USD program and 65 percent in DSD.

The DSD program has especially emphasized the improvement of the quality of faculty and graduate students as the principal means of institutional development. Nearly two-thirds (65 percent) of the DSD funds have been allocated for manpower. The comparable figure for the USD program is 40 percent. One important difference between the two programs is that only small amounts of DSD grants have been for renovation of facilities, whereas nearly one-fourth of the funds of the USD grants has been for construction or renewal of science buildings. Both programs have allocated a substantial share of their funds for the purchase of equipment and supplies and some funds for library resources, computer costs, and travel.

By field of science, slightly over half of the USD program funds was for physical sciences and about one-sixth for life sciences. Engineering accounted for 12 percent, mathematics for 11, the social sciences for

6, and environmental sciences for 3. A considerably larger share of DSD program funds has been awarded for the social sciences—13 percent in all years and 22 percent in fiscal year 1970.

The Foundation has expected institutions receiving development grants to make contributions of their own funds to their improvement. Thus, the institutional commitment under the DSD program amounts to nearly one-half of the estimated total development cost; the \$33.1 million in DSD grants amounts to only 17 percent of the total; the remainder (about one-third) of the development costs is expected to come from other sources. Similarly, under the more expensive development activities aided by USD grants, institutions have committed themselves to make contributions greater than the Foundation. Thus far, most institutions in the USD program have contributed from their own resources at least as much as they had initially projected, and sometimes considerably more. Experience under this program, which is greater than under the newer DSD program, indicates that universities can construct realistic plans which set important and attainable goals; that the NSF grants have stimulated improvement not only in the departments supported but often in other parts of the institution; and that the achievement of an institution's primary goals justifies supplementary NSF investment in support of its further planned development.

One of the chief hopes for the USD program was that it would eventuate in the emergence of very high quality universities in areas of the country having none or too few such centers. A similar goal to strengthen resources for advanced scientific education and research in as many regions and population centers of the nation as possible animated the DSD program. The accompanying maps show how this

purpose has thus far been attained through the development programs. Underlying this policy of geographic distribution has been the desire to further the national goal of equality of opportunity for higher education and to help achieve equitable distribution of the beneficial effects of strong educational and research centers.

The separate University and Departmental Development programs were incorporated in a new Science Development program near the close of fiscal year 1970. Besides making departmental grants, this reshaped institutional development program will provide continuing opportunities for supplementary grants, as well as other forms of developmental support, to the institutions that have already received awards through the USD program. The program will also expand institutional development activities of the Foundation in new directions by seeking to stimulate the development of institutional capabilities in the social sciences and interdisciplinary areas so that the recipient universities can effectively partici-

pate in the solution of important problems confronting society. The nation's foremost universities, which have formerly been discouraged from applying for NSF development funds, will be eligible for support under some of the new categories of institutional development. Also, in attempting to develop centers or institutes focusing on national problems, the Foundation will foster concerted efforts of a variety of institutions, nonacademic as well as educational.

(A related development program—College Science Improvement—is discussed in the chapter on Education in the Sciences.)

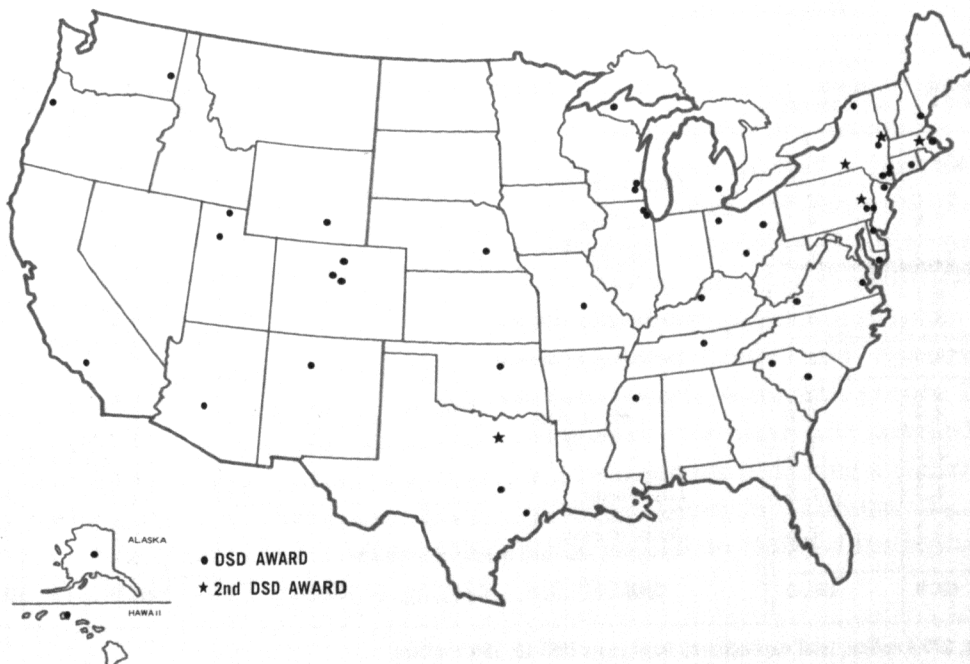
GRADUATE SCIENCE FACILITIES

Graduate Science Facilities, the first of the Foundation's institutional programs, completed its 11th year in fiscal year 1970. Aimed at sustaining the strength of graduate-level science departments, the program provided funds for the reno-

vation and construction of academic facilities for research and research training. In fiscal year 1970 the Foundation obligated through the program \$4 million to 15 institutions. The average grant was \$267,178, substantially below the average of \$446,000 in fiscal year 1969. As noted above, the Foundation has decided to discontinue, for a year at least, Graduate Science Facilities as a separate program and to use its resources in the reoriented science development activity.

During the 11 years since its inception, the Graduate Science Facilities program provided \$186 million to 179 different institutions of higher education. The recipient institutions were required at least to match the NSF funds. They usually overmatched. The actual facilities constructed with NSF support have cost about half a billion dollars and accommodate approximately 40,000 academic personnel in research and graduate education. The 10 million net square feet of space they use is comparable in size to the entire academic facilities of Michigan State University (East Lansing) and the University of Maryland (College Park) combined.

DEPARTMENTAL SCIENCE DEVELOPMENT GRANTS
FISCAL YEARS 1967-1970



INSTITUTIONAL GRANTS FOR SCIENCE

Through its program of Institutional Grants for Science the Foundation provides funds for the general support of science in U.S. colleges and universities. Campus officials determine how the grants will be used, and this discretionary nature of the funds makes them uniquely adaptable to local circumstances.

In fiscal year 1970 the Foundation made an important change in the program. In earlier years the grants had been computed by applying a graduated arithmetical formula to the amount of NSF research



Dreyfus Chemistry Building at Massachusetts Institute of Technology. (Photo MIT)

and research-training support received by an institution. The fiscal 1970 awards were computed on a much wider Federal base—the research obligations to colleges and universities of the Departments of Agriculture; Commerce; Defense; Health, Education, and Welfare (exclusive of the Public Health Service); Housing and Urban Development; Interior; Transportation; the Atomic Energy Com-

mission; the National Aeronautics and Space Administration; the National Science Foundation; and the Office of Economic Opportunity. (The Public Health Service awards were excluded to prevent overlap with similar formula-grant programs of the National Institutes of Health.) In addition to these Federal research obligations (for fiscal 1968) the Foundation continued to include in the computation

base awards made through the NSF programs of Undergraduate Research Participation and Research Participation for College Teachers.

The extension to a broad Federal base resulted in the eligibility of many institutions that had not participated in the program before. The largest number of Institutional Grants in any earlier year had been 517; in fiscal 1970 grants totaling \$14.5 million were made to 634 institutions. The formula continued to provide 100 percent of the first \$10,000 of an institution's base figure, but the subsequent percentages were much smaller than in earlier years. The largest grant (\$138,967) amounted to less than one-fifth of one percent of the amount on which it was based. Some institutions that had participated in the program before benefited from the shift to a broader Federal base, but most did not. The average grant dropped from \$28,410 to \$22,894, and the median grant from \$13,256 to \$10,800. Eighty institutions that had received fiscal year 1968 grants suffered reductions of 30 percent.

Since the beginning of the pro-

Table 9
Uses of Institutional Grant Funds
Fiscal Years 1962-69

(Millions of dollars)

A. Type of use:	Amount spent ¹	Percent of total expenditures	B. Field of science:	Amount spent ¹	Percent of total expenditures
Equipment and supplies.....	\$34.8	50.6	Physical sciences.....	\$24.6	35.7
General.....	32.0	46.5	Astronomy.....	1.0	1.5
Libraries.....	2.8	4.1	Chemistry.....	12.5	18.2
Facilities.....	11.2	16.3	Physics.....	10.1	14.7
General.....	8.1	11.7	Other.....	0.9	1.3
Computers.....	3.2	4.6	Mathematical sciences.....	3.4	5.0
Personnel.....	19.3	28.1	Environmental sciences.....	5.5	8.0
Faculty salaries.....	9.0	13.1	Atmospheric sciences.....	0.8	1.1
Graduate assistants.....	3.9	5.6	Earth sciences.....	3.9	5.6
Other student stipends.....	1.9	2.7	Oceanography.....	1.0	1.4
Visiting lecturers.....	1.1	1.6	Engineering.....	8.6	12.5
Technicians' salaries.....	1.8	2.6	Life sciences.....	14.7	21.4
Other.....	1.7	2.5	Psychology.....	2.7	3.9
Travel.....	1.7	2.5	Social sciences.....	4.2	6.1
All other.....	1.7	2.5	All other (inter- and multidisciplinary).....	5.2	7.5
Total.....	68.9	100.0	Total.....	68.9	100.0

¹ From awards made fiscal years 1961-68. Total amount of awards, \$79.4 million; total expenditures fiscal years 1962-69, \$68.9 million.

NOTE: Totals do not add because of rounding.



C. T. Elvey Building, The Geophysical Institute, University of Alaska. (Photo University of Alaska)

gram in fiscal year 1961, the Foundation has made Institutional Grants amounting to \$94 million to 820 colleges and universities. Many of these institutions have participated in the program every year.

As table 9 shows, about half of the funds has been spent for equipment and supplies; about one-sixth for construction, renovation, and computer costs; over one-fourth for personnel; and small amounts for travel and other uses. By field of science, more than one-third of the funds has been allocated to the physical sciences and more than one-fifth to the life sciences. The social sciences and psychology if combined accounted for one-tenth of the total expenditures.

Although the grants are not large, their flexibility makes them unusually useful for such purposes as the following: ensuring a backup for commitments and freedom from normal budgetary constraints; making available small research grants

for new faculty members; providing means of keeping graduate students on campus during the summer and of speeding up the earning of degrees; encouraging undergraduate research and interest in scientific careers; facilitating the employment of new faculty members; bolstering neglected departments or areas and maintaining balance; breaking down traditional barriers between departments and colleges; fostering the development of central services used by several departments; and exploring new means of instruction and new fields of research. Local control and ready availability of the funds have permitted institutional officials to respond quickly to unanticipated needs and opportunities. In such ways the grants have helped to maintain the strength of academic science during a period of growing financial constraints and have helped to uphold institutional autonomy.