

Institutional Programs

In fiscal year 1971, the Foundation's institutional programs provided substantially larger support for social science departments, made supplementary grants to nine universities to permit them to complete the final stages of their comprehensive plans for quality improvement, and awarded the 10th annual series of Institutional Grants for Science to 659 colleges and universities. The Science Development Program also received and evaluated a variety of proposals for the development of interdisciplinary and problem-oriented research capabilities. The suspension of the program in February resulted in the transfer of several of these proposals to the program of Research Applied to National Needs where, after some modification, they received support through that new Foundation activity.

During the 7 years since the establishment of the Science Development Program, the Foundation has awarded \$222 million to 102 universities to assist them in improving the quality of their research and educational activities in science. Most of these grants still have from 1 to 3 years to run.

One other major institutional program, Graduate Science Facilities, was suspended at the beginning of fiscal year 1971. During the 11 years of its activity, the Graduate Science Facilities Program provided \$186 million to 179 institutions of higher education for the renovation and construction of academic facilities for scientific research and research training.

The Foundation's obligations under the institutional programs discussed below are shown in table 11.

INSTITUTIONAL GRANTS FOR SCIENCE

Institutional Grants for Science provide general support for science in a large number of colleges and universities. Unlike other NSF

awards, which are based on individual or institutional proposals to perform specific kinds of research or educational activities, institutional grants permit college and university officials to allocate Federal science funds at their own discretion. Local determination of the use of the grants, so long as the funds are spent only for direct costs of science, makes the program a highly valued one among university and college administrators.

Since the program began in fiscal year 1961, over 900 colleges and universities have received institutional grants, and many of these institutions have received grants every year. For all 10 years, the grants total \$108.4 million. In fiscal year 1971, 659 institutions—the largest number to participate in any single year—received grants amounting to \$14.5 million. Each of the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands had one or more institutions receiving grants in fiscal year 1971. Although the grants ranged from \$1,000 to \$142,756, the average grant was only about \$22,000, about \$14,000 less than the average 5 years before. The program budget has remained at approximately the same level since fiscal year 1966 despite a substantial increase in the number of institutions eligible to receive the grants.

Eligibility for an institutional grant depends on the receipt of Federal awards for scientific research. For several years, only NSF grants served to establish eligibility, but in fiscal 1970 the Foundation put into effect a suggestion made by the Federal Council for Science and Technology that the grants be based on the research awards of other Federal science agencies as well as those of NSF. Although many institutions benefited by participation in the program for the first time because of the shift to a broader Federal base, many regular participants received smaller grants than before.

In fiscal 1971, as in the year before, each institution's award was

Table 11
Obligations For Fiscal Years 1968, 1969, 1970, and 1971
 (Millions of dollars)

Program	Fiscal year 1968		Fiscal year 1969		Fiscal year 1970		Fiscal year 1971	
	Number of Awards	Amount	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	9	\$11.2
Departmental Science Development	22	12.0	15	8.6	18	10.6	14	8.7
Institutional Grants for Science	497	14.2	(¹)	(¹)	634	14.5	659	14.5
Graduate Science Facilities	50	17.8	14	6.0	15	3.7	(²)	(²)
Total	578	73.6	38	37.7	676	44.7	682	34.4

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

² The Graduate Science Facilities Program was suspended in fiscal year 1971.

determined by applying a graduated arithmetical formula to the institution's "base" amount—that is, the total amount of Federal support for scientific research (not including support from the U.S. Public Health Service) in fiscal year 1969. (Public Health Service research awards are excluded from the base to prevent any overlap with a similar program of formula grants conducted by the National Institutes of Health.) The departments and agencies whose research awards entered into the computation of institutional grants were: Departments of Agriculture; Commerce; Health, Education, and Welfare (excluding PHS); Housing and Urban Development; Interior; and Labor; Agency for International Development; Atomic Energy Commission; National Aeronautics and Space Administration; National Science Foundation; and Office of Economic Opportunity.

Although the formula used in calculating the grants provided 100 percent of the first \$10,000 of an institution's base, in the next step the percentage was reduced to 2.25, and the universities receiving the largest amounts of Federal research funds derived only 0.05 percent of the base amounts above \$20 million. The sharply tapered formula results in institutional and geographic distribution of institutional grant funds which differs somewhat from the distribution of the research funds on which the grants are based. Although undergraduate institutions

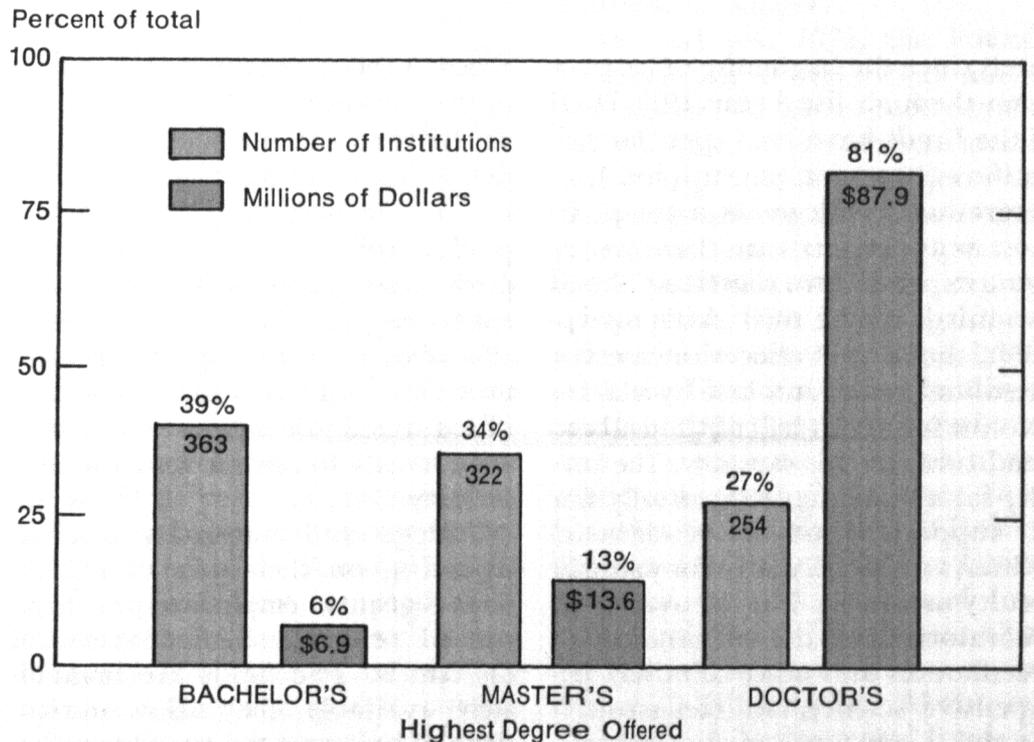
receive only a small percentage of institutional grant funds, their share would be much less without the 100 percent feature of the formula.

Of the 659 institutions receiving grants during the year, well over two-thirds offered graduate degrees—37 percent offering the doctorate degree in one or more fields and an additional 35 percent offering the master's; the remaining 28 percent awarded no degrees higher than the bachelor's. Three-fourths of the in-

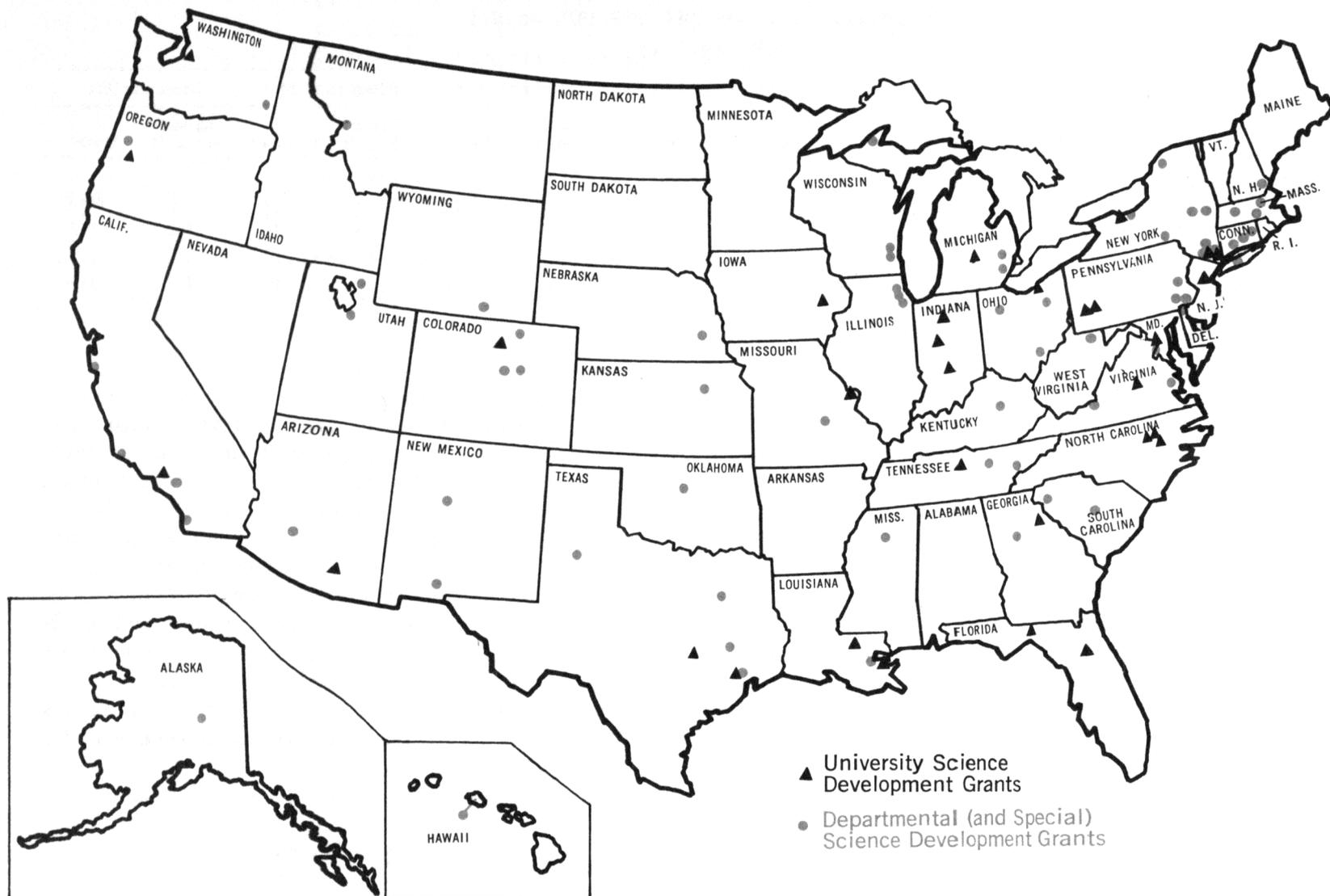
stitutional grant funds were awarded to the doctoral-level institutions, about one-sixth to the master's grantors, and less than one-tenth to the entirely undergraduate colleges. The accompanying figure shows, for all years of the program, the number and percentage of each of these three groups of institutions and each group's share of the total amount of institutional grant dollars.

Table 12 shows how the recipients of institutional grants have used the

INSTITUTIONAL GRANT AWARDS FOR FISCAL YEARS 1961-1971



SCIENCE DEVELOPMENT GRANTS FISCAL YEARS 1965-1971



funds since the beginning of the program through fiscal year 1970. Half of the funds have been spent for scientific equipment and supplies. Undergraduate colleges, as a group, in most years report that their equipment expenditures constitute about two-thirds of the total. After equipment, the largest allocations are for personnel costs, and faculty salaries account for about half of the total expenditures in this category. The faculty salary payments are usually for the support of summer research activities, and particularly for younger faculty members. The renovation of laboratories and the construction of greenhouses and other relatively inexpensive science facilities account for about one-tenth of the expenditures. In aggregate, the institutions

allocate about one-third of the funds to the physical sciences and about one-fifth to the life sciences. In recent years there has been a gradual rise in the percentage of funds expended for the social sciences and psychology; universities are more apt to report a large share of their allocations to the social sciences than are undergraduate colleges, whose need for laboratory equipment tends to have a much higher priority.

College and university officials, reporting on their uses of institutional grants, emphasize the high rate of return and effectiveness of the funds. The funds are immediately available; they allow institutions to buy essential equipment before price rises and to take advan-

tage of other opportunities for savings. Frequently the grants permit institutions to provide continuing support of research projects during temporary lapses in outside funding, and they enable institutional officials to make commitments during delays in State and Federal appropriations proceedings. Besides sustaining important ongoing activities, the funds give administrators leverage to put new ideas into effect and to encourage interdepartmental programs and cooperative undertakings with other institutions.

SCIENCE DEVELOPMENT

Foundation programs for the improvement of science in doctoral-

Table 12
Uses of Institutional Grant Funds
Fiscal Years 1962-70
(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	\$41.1	50.1	Physical sciences	\$28.5	34.8
General	37.8	46.1	Astronomy	1.2	1.5
Libraries	3.3	4.0	Chemistry	14.6	17.8
Facilities	13.3	16.2	Physics	11.5	14.0
General	9.1	11.1	Other	1.2	1.5
Computers	4.2	5.1	Mathematical sciences	4.2	5.1
Personnel	23.6	28.9	Environmental sciences	6.7	8.2
Faculty salaries	11.1	13.5	Atmospheric science8	1.0
Graduate assistants	4.7	5.7	Earth sciences	4.6	5.6
Other student stipends	2.3	2.8	Oceanography	1.3	1.6
Visiting lecturers	1.2	1.5	Engineering	10.4	12.7
Technicians' salaries	2.2	2.7	Life sciences	17.6	21.5
Other	2.1	2.7	Psychology	3.3	4.0
Travel	2.0	2.4	Social sciences	5.2	6.3
All other	2.0	2.4	All other (inter- & multidisciplinary)	6.1	7.4
Total	82.0	100.0	Total	82.0	100.0

¹ From awards made fiscal years 1961-69. Total amount of awards, \$93.9 million; total expenditures fiscal years 1962-70, \$82.0 million.

level universities were reoriented in fiscal year 1971. The revised Science Development Program represented a restructuring of the earlier University Science Development and Departmental Science Development programs into a form that would not only further the original objectives, but would also help build research and educational competence which could contribute to the solution of national problems.

Four categories of science development proposals were invited under the restructured program:

1. To strengthen departments or groups of departments in the natural sciences, mathematics, and engineering. (Essentially this category provided for the continuation of single-department awards like those made under the Departmental Science Development Program or multidepartment supplementary awards to institutions which had earlier received 3-year grants under the University Science Development Program.)
2. To strengthen the social sciences, computing sciences, and

other areas that have been inadequately funded or whose rapid improvement is a national need.

3. To help academic institutions develop research and training activities that combine traditional scientific and engineering disciplines in ways to create new interdisciplinary approaches to the attack on scientific problems and the solution of social problems.
4. To develop centers and institutes that are directly aimed at problem-solving activities in the national interest.

Nearly all of the grants actually awarded through the Science Development Program were of the first two types. Early in 1971, a decision was made to suspend the Science Development Program, and about half of the fiscal year's allocation of development funds was reprogrammed to other areas of the Foundation. No new proposals were accepted thereafter by the Science Development Program. A number of the category 3 and category 4 proposals, submitted to the program earlier by academic and other kinds of institu-

tions, had already been evaluated, and some of these had been recommended for funding. The problem-orientation of several of these proposals made them suitable for consideration by the newly organized program of Research Applied to National Needs and, after appropriate modifications to fit the research emphasis of RANN, they received Foundation support.

In fiscal year 1971, the Foundation awarded a total of \$20 million for support of 23 science development projects. Nine of these awards, amounting to \$11.2 million, were university science development supplemental awards to support the final 2 years of broad 5-year improvement plans; the initial grants to these nine universities totaled \$39.5 million. The institutions qualifying for the supplemental awards, by reason of significant progress toward their long-term goals, were North Carolina State University at Raleigh, Rutgers University, Tulane University, and the Universities of Iowa, Maryland, North Carolina at Chapel Hill, Notre Dame, Texas at Austin, and Washington. About one-third of the supplemental funds will be used for improvement of the life

sciences, one-fourth for physical sciences, and nearly one-sixth for the social sciences. Mathematics and computing sciences, environmental sciences, and engineering account for the remainder of the allocations. Over 60 percent of the funds will be used for personnel costs and 36 percent for equipment and supplies.

The other 14 science development grants, largely of the departmental type, totaled \$8.8 million. By far the largest part of these 3-year grants will be used for improvement of social science departments. Six grants, totaling \$4.7 million, were awarded for departmental development in anthropology (Southern Methodist University); economics (Texas A&M University and University of California, San Diego); psychology (Claremont Graduate School and University of Massachusetts); and sociology (Washington State University). In addition, a grant of \$1.5 million was made for the development of the Institute of Social Science at Yale University. An award of \$848,000 for the Institute of Fundamental Studies at the University of Rochester will be used for the development of interdisciplinary capabilities for the study of several kinds of urban, economic, and environmental problems and for research on the quantitative aspects of social indicators which measure changes in society. The remaining six departmental grants will support improvements in biology (State University of New York at Albany); chemistry (Emory University and University of Utah); electrical engineering (Texas Tech University and University of California, Santa Barbara); and geology (University of Montana). Three-fourths of the funds in all 14 grants will be used for personnel costs, and nearly all of the remainder for equipment and supplies.

Since the first science development grants were announced in fiscal 1965, the Foundation has awarded through these programs a total of \$222 million to 102 institutions.

About 260 departments or areas of science—approximately 8 percent of the more than 3,000 university science departments engaged in Ph.D. training—have received support through the science development programs; the universities have also contributed large amounts of non-Federal funds to the improvement of the departments. As the accompanying map shows, the programs have furthered one of the Foundation's original aims when it started the experiment of investing Federal funds in the improvement of universities—to stimulate the building of university science education and research of the highest quality in all parts of the nation. Through assisting universities to carry out their plans for quality improvement, the Foundation believes that it has helped to further the goal of equal educational opportunity for all citizens and to foster the kinds of economic, social, and cultural benefits that accrue to communities and regions from excellent universities.

Some of the development grants have now terminated, but at the end of fiscal year 1971, more than 100 were still in progress. Attention is now being directed to the important task of studying the impact of the science development grants. There are several indications that the grants have been instrumental in bringing about substantial improvement in the grantee institutions—for example, in ability to recruit outstanding faculty members, to attract better graduate students, and to participate in Federal research support programs. Thus far, however, most of this evidence comes from institutions receiving university science development grants rather than from those receiving awards through the departmental program, which was started later.

The Science Development Program, undertaken by the Foundation in 1964 after several years of study and planning, has been one of the most exciting experiments in Government-university relations

during the past decade. From the outset, the Foundation's paramount objective was to improve the quality of research and instruction in science departments already conducting doctoral programs of recognized merit. The intention was to ensure that qualified students who chose scientific careers would have opportunities to pursue that choice and receive first-rate training, and not solely in one of the score of geographically clustered institutions that had already achieved recognition as "centers of excellence." The science development grants were awarded in every instance for improvement of departments that were already engaged in Ph.D. training and that were considered to have suitable strength upon which to build further. No new graduate departments were created. Only about one in 12 of the 3,000-plus departments offering doctoral training in science benefited directly from university or departmental science development grants, though the Foundation believes that the improvements in quality in the supported departments have stimulated improvements in related areas as well. Grants have been awarded to 102 universities, but in most institutions only a single science department out of all of those in the natural sciences, the social sciences, and engineering has received NSF development funds.

The choice of institutions and departments for science development grants has been rigorously selective. Because of this selectivity it is all the more important that this experimental Federal program, designed to select good quality and to help universities improve it significantly, be subjected to close study. A careful evaluation of the experiment—both as it affected the 102 universities directly involved, and the rest of higher education as well—should furnish invaluable information for future planning of Federal programs in science and higher education.